

digit

April 2007

Fast Track to **THE STUDENTS'** **WEB**

*The Choicest Online
Learning Places*

Physics

Chemistry

Biology

History

Geography and Civics

Mathematics

Engineering

Commerce

Arts

YOUR HANDY GUIDE TO EVERYDAY TECHNOLOGY

Fast Track to The Student's Web

The Choicest Online Learning Places

By Team Digit

Credits

The People Behind This Book

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Back To School

If you've been reading *Digit*, you'll have seen that we place a lot of emphasis on fun with computers, and fun on the Internet. Yes, the Internet is certainly a fun place. But all play and no work is not good, hence this *Fast Track*, which reviews and points you to a large number of educational sites on the Web.

It's a little sad, really, how few of us use the Net for educating ourselves. (This applies to everyone, not just students.) "Infotainment" is what they call it, but we usually skip the "info" part of it.

There are several reasons we decided upon this unconventional *Fast Track*. First, it is, like we said, to bring to your attention the simple fact that the Web can educate. Second, we have tried to point students—from eighth-standard kids right to those in engineering colleges, for example—to useful sites that can complement their textbook reading. And perhaps most important, we're trying to encourage school students to go beyond what their textbooks tell them, and develop a broader perspective on the world. Yes, education is all about increasing your awareness: it doesn't really matter that the GDP of Great Britain was so many dollars in 2002. But when you're exposed to such information—which you'll doubtless forget after a few years—it's your awareness of the world, in a holistic way, that increases.

On a different note, can't you Google and find the information yourselves? You can. But to find the best sites would take quite a bit of time, and we're saving you that labour. Since we've also reviewed the sites we present, you can choose what site you want to spend time on, so you don't end up wasting time on sites that don't really matter.

Some sites we present are strictly functional—they can help you with your exams. Some are broader, and should be given a look in the interest of developing a holistic perspective on things, like we said.

Go ahead, explore what the Web has to offer in terms of free education. And don't forget to write in if you manage to impress your teachers!

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Physics



Physics is a challenging subject, probably next only to maths. Exams are typically at least 50 per cent problem-oriented, and a student needs all the help he can get with the concepts required to solve them—and sometimes, a textbook is not enough. Presented here are sites that increase your understanding of physics, whether for your exam preparation or for the sake of interest.

1.1 Introduction

Education should be free—as in unshackled. Free from classrooms and time tables and syllabi. Any person eager to get educated should have convenient access to the relevant information. Education cannot be free—as in free of charge—since even if the information is freely available, there is a cost incurred in distributing information, either through teachers or through textbooks. But, it can be made dirt cheap or practically free by reducing the cost incurred in its distribution. An opportunity is presented by the Internet to achieve truly, dually free education. The Net offers significantly cheaper storage and distribution channels making it possible to offer information, almost free of charge—since the Net access charges still remain. And the always open nature of the Internet means people can access the information at their convenience—time and place become immaterial.

It is rather unfortunate that a country like India with a large illiterate population has not yet exploited the power of the Web to make education easily accessible. None of the sites reviewed here have an Indian connection. Of course, you could freely download the CBSE textbooks from www.ncert.nic.in/textbooks/index.htm, but merely offering downloads of textbooks would be overlooking the power of the Internet to be a great medium for interactive learning. Additionally, with most of the studying population following state syllabi, this act by NCERT, meagre as it already is, loses even that significance. Nevertheless, it is a step in the right direction, and something all state education boards ought to emulate.

Thanks to the universal nature of science as a field of study, it doesn't matter that the sites reviewed here have no Indian connection. The laws of Newton are the same across the world, as are the equations to calculate different physical entities. So while the presentation and choice of chapters may vary, the content retains its relevance.

The sites available on the Net can be classified into two types: ones that offer straight and simple information in a style similar to that seen in textbooks, and the ones that offer learning aids that enhance the ability to grasp the crux of a concept, either as animations or as review questions or quizzes. General sites like www.howstuffworks.com which offer excellent, multimedia-enriched information are not covered here since they do not offer a cohesive and comprehensive look at a subject. But they are still excellent reference sites where detailed explanations can be sought in case other sites are unable to satisfactorily demystify a concept to the student.

Since almost every site reviewed here extensively uses non textual content it is important that the browser be up to the job. To view flash animations, Java applets, QuickTime movies, etc., you need the relevant browser plugins. The links to the appropriate download locations are also provided on the sites, which can be used to update the browser. Besides plugins, it would also be necessary, sometimes, to turn down the trash filtering capabilities of the browser to fully enjoy what the site has to offer. Ad blocking applications can block animated content or prevent them from repeating the cycle, and disable JavaScript-created effects.

1.2 Glenbrook South Physics Home Page

(www.glenbrook.k12.il.us/gbssci/phys/phys.html)

An excellent site for all physics students, this is a creation of the physics tutors at Glenbrook South High School. This site offers all the tools that make the study of physics interesting to students. Besides the section offering plain lessons enhanced with pictures and animations, there is a section on questionnaires to test a student's knowledge, a multimedia section containing movies on experiments in physics, and a section on projects done by the students of the school.

Glenbrook South Physics Home Page

A Full Service Physics Education Web Site

GBS Physics Courses - Quick Links

Glenbrook High Physics

The “Physics Classroom” link takes you to the actual courseware. The topics covered include Kinematics, Newton’s Laws, Vectors—Motion and Forces in Two Dimensions, Momentum and its Conservation, Work, Energy and Power, Circular Motion and Satellite Motion, Waves, Sound Waves and Music, Light Waves and Color, Reflection and Ray Model of Light, Refraction, and the Ray Model of Light. The coverage is somewhat limited in range, but that deficiency is more than made up by depth.

Every chapter is further divided into sections which are spread across many pages, making it easier to digest the content. There is an abundance of images, animations and examples to make the explanation more vivid. Every concept is followed by a quick review and also a small case study applying the concept to situations in real life. There are small quizzes following every subsection, under the “Check Your Understanding” title to test a student’s grasp of a concept.

The “Multimedia Physics Studio” allows access to learning aids on the site. Here, too, the data is categorised as chapters similar to the courseware. Each chapter is further divided into sections containing the animation and the text explaining the concept as well as its application in the animation. Besides simple animations, there are longer animations in QuickTime format. These are considerably fewer in comparison. Another sec-

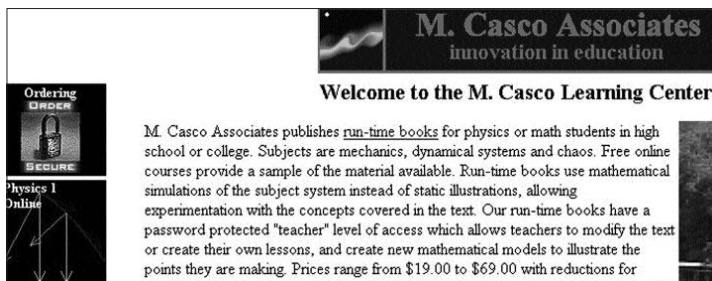
tion, the “Shockwave Physics Studio” contains even more animations in Flash format. These animations allow the student to interact with them by changing the parameters and watch the difference in the animation. A few of the links on the page are not yet functional.

The site offers many forms of quizzes and questionnaires to test a student’s knowledge. Under the “Minds on Physics Internet Modules,” a student is offered multiple-choice questions on all topics covered in the courseware. Before being able to use the tests, one needs to sign up as a Guest. This information is used to track the results of a student’s attempts. The “Review Session” link also offers multiple choice questions, as does the “Quiz Room” link. Those students who would like to apply the knowledge they gained from the site can visit the “Refrigerator” link, where the notable projects undertaken by the school’s students are mentioned. The students offer an account of the project along with the procedure followed, observations made and conclusions drawn. The “Projects Corner” link offers similar content but contains project ideas, as well as marking pattern, as presented by the tutors. Nevertheless, students can use the procedure on executing an experiment, described there.

The absence of ads makes browsing through the site a pleasant experience. The navigation is simple, font sizes are conveniently large, and the images and animations are not too heavy to significantly increase load times. All these make the site one of the best targets for downloading *en masse* with a Web site extractor for convenient browsing offline.

As a side note, the site offers a glimpse of educational techniques employed in a developed country. By accumulating all relevant resources—information, learning aids, quizzes and lab experiment ideas—for students and teachers at one place, the site acts as the single tool for all students to have, making the need for every student to have individual textbooks and other reference material redundant.

1.3 M Casco Associates Physics 1 Online Course



M. Casco Associates
innovation in education

Welcome to the M. Casco Learning Center

M. Casco Associates publishes **run-time books** for physics or math students in high school or college. Subjects are mechanics, dynamical systems and chaos. Free online courses provide a sample of the material available. Run-time books use mathematical simulations of the subject system instead of static illustrations, allowing experimentation with the concepts covered in the text. Our run-time books have a password protected "teacher" level of access which allows teachers to modify the text or create their own lessons, and create new mathematical models to illustrate the points they are making. Prices range from \$19.00 to \$69.00 with reductions for

M Casco Physics

(www.mcanv.com/index.html)

This site is the creation of M Casco Associates, a firm dealing with educational tools for mathematics and physics. The content has been created by J D Jones, a co-founder of the firm, who is not a teacher per se, but has spent some time teaching. The language on the site is not pedantic as seen in textbooks, which immensely adds to the enjoyment of learning—while reading, one could easily imagine being in the presence of the author and listening to him speak. Thanks to the long years he has spent applying and teaching concepts of physics, the interesting insights he offers about the subject and its relevance are quite valuable. Unfortunately, Jones restricts the discourse to only the field of mechanics.

The Physics 1 Online course can be accessed from the link on the right side bar. Topics covered on the site are Measurement in Mechanics, Rate of Change, Motion in One Dimension, Constant Acceleration in One Dimension, Vector Arithmetic, Motion in Two Dimensions, Newton's Laws of Motion, Applying Newton's Laws of Motion, Circular Motion, Work and Kinetic Energy, Potential Energy and Fields, Systems of Many Particles, Linear Momentum and Collisions, Rotation, Rotational Dynamics, Equilibrium and Elasticity, Vibration, Gravity, Fluid Mechanics, and Mechanical Waves.

There are a lot of images, charts and graphs alongside the text to make comprehension of concepts easier. The author has identified concepts which could be difficult for a student to grasp and these are prominently marked. All the charts displayed on the site are screenshots of applets which can be accessed through the links alongside. The applets can be modified based on user's values and this interactivity enhances the teaching capabilities of the site. Every applet is accompanied by a description on how to use it and what the results mean. The definitions of the terms used in the site are compiled under a Glossary for easier access. Students can directly contact the author with their doubts, and he restricts this service to those students who register on the site. Registration is free and easy.

Besides the Physics 1 Online course, another source of information is the Answers link available at the home page. This leads one to the questions already sent by students, and the answers to them as provided by the author of the site. The questions are not limited to mechanics and cover the entire range of studies under physics.

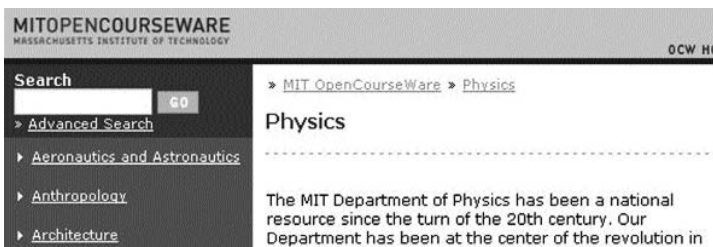
A few drawbacks of this site include the author's occasional tendency to refer to the products of the firm and its capabilities. The author uses no-nonsense learning aids like line diagrams and doesn't use colourful animations, though there are colourful pictures used occasionally. This can be explained by the fact that the firm's products are Java-coded learning aids based on the same lines. The description on how to use the applet can sometimes get too complicated to take away the eagerness of using it and learning from it. There is a distinct bias towards the use of quantitative techniques to put across a point, as seen in use of the applets. The chapters are not broken down into manageable chunks; rather, a chapter is allocated one page, no matter how long. And there are no quizzes or questionnaires for a student to test newly-acquired knowledge. All this leads one to believe that the intended audience is not the average school student, rather someone who just seeks knowledge.

In conclusion, this site is best used by students who are not keen on following the beaten track of most school curriculum based Web sites. The conversational style of presentation and focus on numerical data as learning tools would appeal to the engineer at heart.

1.4 Massachusetts Institute of Technology Department of Physics OpenCourseware

(<http://ocw.mit.edu/OcwWeb/Physics/index.htm>)

OpenCourseware, as is evident, refers to “free and open digital publication of high quality educational materials, organized as courses” (www.ocwconsortium.org/about/index.shtml). The OpenCourseware Consortium is a group of institutions heading this movement. And MIT is one of them. As a part of its contribution to the cause, MIT offers its educational material free in digital format. Physics is just one of the subjects available here; almost



OCW at MIT

the entire gamut of subjects offered at any University is available for free on this site (<http://ocw.mit.edu/OcwWeb/index.htm>). With a reputation to uphold, the content on the site can be expected to be top-notch.

Physics courses targeted at graduates and undergraduates are offered here, with the topics arranged under relevant topics. The undergraduate graduate course includes topics such as Classical

Mechanics, Electricity and Magnetism, Vibrations and Waves, Relativity, Quantum Physics, Statistical Physics, Electromagnetism, Special Relativity, General Relativity & Astrophysics, Physics of Solids, String Theory for Undergraduates, Introduction to Computational Neuroscience, Introduction to Astronomy, Modern Astrophysics, and Particle Physics.

Under the Graduate level the following topics are covered: Electromagnetic Theory, Quantum Theory Relativistic Quantum Field Theory Statistical Mechanics of Particles, Statistical Mechanics of Fields, Classical Mechanics: A Computational Approach, Quantum Information Science, Atomic and Optical Physics Theory of Solids Many-Body Theory for Condensed Matter Systems, Strongly Correlated Systems in Condensed Matter Physics, Statistical Thermodynamics of Complex Liquids, Systems Biology, Statistical Physics in Biology, Introduction to Neural Networks, Introduction To Plasma Physics Introduction to Nuclear and Particle Physics, Astrophysics, Cosmology, and General Relativity.

Unlike other sites, this one doesn't offer any standard educational content in the form of text, images, etc., broken down into chapters. The nature of the information includes lecture notes, pictures of blackboards taken when being used by professors, presentation slides, assignments with solutions, exams with solutions, video recording of lectures, etc. And all these, except the video recordings, are offered in downloadable format. The downloadable content is displayed on the right sidebar of every topic page. The lecture notes are mostly in PDF format, while the video recordings are in Real Media format. The entire basket of educational material is available for download in the ZIP format. Every compressed archive contains the online course Web pages and all content except video recordings. These are in streaming video format and can be accessed through the links provided. It is not necessary to download the course content *en masse*, since individual links to each category of content—lecture notes, assignments, quizzes etc—are also provided, and can be used to download relevant content only.

The available content types varies from topic to topic, since as admitted by MIT, “Each MIT OCW course Web site is developed individually with the participating faculty and instructors. MIT faculty and instructors publish only as much content as they are comfortable having on a Web site that is freely accessible worldwide.” (<http://ocw.mit.edu/OcwWeb/Global/OCWHelp/help.htm#18>). So, some faculty members may only offer a reading list and a set of questionnaires; while someone like Professor Levin offers the whole nine yards including the complete video recording of the lectures. Professor Levin’s topics are Newtonian Mechanics, Electricity and Magnetism, and Vibration and Waves for the undergraduate course. Since the recordings are in Real Media Streaming format, you need to be online to view the stream. Alternatively, you can follow the steps mentioned at <http://federermagic.blogspot.com/2005/06/how-to-save-streaming-videos.html> to save the recordings for offline viewing. Expect file sizes to be large!

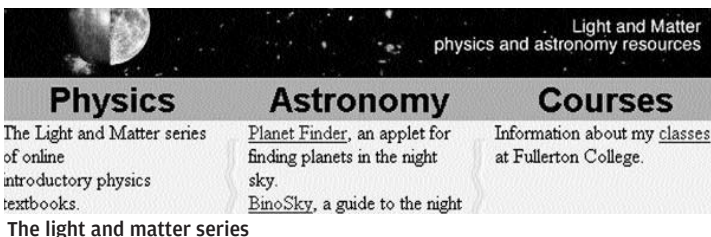
The bulk of the content offered at the site is at best an accessory to enhance one’s understanding of the subject. A student would still need access to a standard source of information, like a textbook or another online site offering educational content, to really exploit the content offered by MIT. Only the video recordings stand as a wholesome educational avenue. The rest, like lecture notes and slides, are small pieces of a puzzle that would be of no use unless the corresponding course content is also available to the student. Similarly the quizzes and questionnaires are also of no use to a student who does not yet have the relevant knowledge.

In conclusion, MIT’s OCW initiative holds a lot of promise and can prove to be a viable alternative to usual educational channels if it could also incorporate standard educational content presently seen in reference books or offer video recordings of all topics. Nevertheless, this initiative offers an excellent opportunity to students worldwide to gain from the expertise of the best that the teaching world has to offer.

1.5 Light and Matter

(www.lightandmatter.com/index.html)

This site is the creation of Benjamin Crowell, a physics and astronomy Teacher at Fullerton College in California. On offer at this site are freely downloadable textbooks under the titles Newtonian Physics, Conservation Laws, Vibration and Waves, Electricity and Magnetism, Optics, and The Modern Revolution in Physics. These books form the Light and Matter series of introductory physics, and are intended for students undertaking a one-year course. They



The screenshot shows the header of the 'Light and Matter' website. The header has a dark background with a moon on the left and the text 'Light and Matter physics and astronomy resources' on the right. Below the header is a navigation menu with three columns: 'Physics', 'Astronomy', and 'Courses'. Under 'Physics' is the text 'The Light and Matter series of online introductory physics textbooks.' Under 'Astronomy' are two links: 'Planet Finder, an applet for finding planets in the night sky.' and 'BinoSky, a guide to the night'. Under 'Courses' is the text 'Information about my classes at Fullerton College.'

Physics	Astronomy	Courses
The Light and Matter series of online introductory physics textbooks.	Planet Finder, an applet for finding planets in the night sky. BinoSky, a guide to the night	Information about my classes at Fullerton College.

The light and matter series

totally constitute about 800 pages of content. The author also offers lighter, modified versions targeted at other audiences. The book titled *Discover Physics* offers reduced mathematical focus, the book titled *Conceptual Physics* is an abridged version and targeted at students adopting a shorter course, and the book titled *Simple Nature* is for engineers and physical scientists.

All the books are available for download in PDF format, and to reduce the download size where necessary, the downloads are split into sets of 50 pages. The book has gained acceptance in a few educational institutions who have included it in their curriculum, and this can be seen as a sign of its quality.

Those not keen on downloading the books can access the same content as offered in the Light and Matter series on the Web site of the Virtual Institute of Applied Science (www.vias.org/about.html). This institute is dedicated to offering inexpensive, high-quality learning material and offers content on other sub-

jects besides Physics. Crowell's textbooks are offered verbatim under the title *Lectures in Physics* (www.vias.org/physics/). Besides the online version, the site also offers the course as a downloadable e-book.

Content-wise, the textbooks are loaded with images and diagrams. There are frequent discussion questions and self-tests to check a student's comprehension of the topic. Every chapter ends with a set of queries for homework, which is expected of any school text book. A few minor differences exist between the versions, and this is probably because the Web site has not been

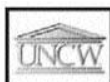


Lectures in Physics at vias.org

updated with the details of the latest revision in the textbook. These differences, though, seem very few and minor. For example, the image of the boat in section 1.2 in the text book is absent on the Web page, but the text is the same.

Since the PDF format files are meant for printing, for a student planning to read the content on the screen the downloadable e-book would be preferred, due to the reduced scrolling required. The ability to quickly access a section of the book through a link also weighs in favour of the online version, though this advantage has not been exploited optimally as seen in the non hyperlinked answers to questions. The link to move to the next page is available only on the top banner of the page, making it necessary to scroll up after reading through a topic.

In conclusion, Crowell's act of making the textbooks free is worthy of emulation by every institution aiming to spread education. The adoption of the textbooks by other institutions vouches for their excellent quality. While the author intended the textbooks to be printed, and offered a file format that was compatible



Physics 101 Elementary College Physics

[Syllabus](#) | [HW](#) | [Materials](#) | [Labs](#) | [Calendar](#) | [Links](#) | [Applets](#) | [Email](#)

Course Profile

- [Syllabus](#)
- [Schedule](#)
- [Students](#)

Resources

- [Course Materials](#)
- [Audio/Video Lectures](#)
- [Related WWW Links](#)
- [Nobel Prize Winners](#)

Elementary college physics at UNCW

for this; it is rather unfortunate that VIAS blindly imported the content to offer it online without modifying it to fully exploit the advantages of the Net. Including links to quickly access the answers to questionnaires would have significantly improved a student's experience. Nevertheless, it remains a worthy contribution to the cause of free education.

1.6 University of North Carolina, Wilmington Elementary College Physics

(<http://people.uncw.edu/hermanr/phy101/index.htm>)

This Web site is the brainchild of Dr Russel Herman. Rather than offer textual data and create content on his own, Dr Herman avoids the labour of reinventing the wheel by offering links to other locations on the Web that have the content that comprises the chapters of the course. Besides offering the links which mostly contain textual data, he also offers the entire video/audio recording of all his lectures on the subject.

The “Course Materials” link on the page takes one to the page offering links organised chapter-wise. Here one can see that there are 17 chapters in the course. Under the chapter link one can access the sites that offer information about the topic. The links span an entire range of Web sites, though most are other educational institutions. The eclectic nature of the selection ensures that a student gets the best information as judged by Dr Herman, available on the Net. This approach frees the student from being restricted to a single source of information. The drawback is the loss of continuity since a student is expected to visit different sites to complete a topic. Besides educational material, there are quizzes also offered on the same page under the “Sample Quizzes/Exams” link.

For even more content, students also visit the “Text Website” link which takes one to the companion Web site of the book “Physics, Sixth Edition by John D. Cutnell and Kenneth W. Johnson”, published by Wiley. The Web site offers a lot of additional learning tools and is supposed to augment the content in the textbook. The “Concept Simulation Link” takes a student to a host of Java applets and Flash animations which can be used to experiment with the various concepts. The applets are arranged chapter-wise, and each is accompanied by a textual description on how to use it, besides an audio introduction offering a background for the applet’s purpose. In case of animations, a commentary accompanies the animation explaining the related concept and walking a student through the different steps. The Self Assessment Tests link and Practice MCAT Quizzes link offer an avenue for the student to test his knowledge. The content on the site is accessible either chapter-wise or category-wise from the menu in the right sidebar.

It is actually easy to see that the 17 chapters on Dr Herman’s page correspond to the 17 chapters of the Wiley book. Dr Herman has successfully avoided copyright issues by using content freely available on the Net to explain the textual matter, and by using the additional content offered for free by the publisher has managed to offer the best of both worlds.

Students not too keen to read up on the content can use the video and audio recording of Dr Herman's lectures on the subject. These are accessible from the "Audio/Video Lectures" link on the main page. The Video Lectures are accessible through a link offered in the first part of the page. The Video files are in the WMV, MP4 or RAM formats. For offline viewing, the MP4 format can be downloaded, while for viewing the lectures as an online stream, the WMV and RAM links can be used. A couple of the links of the video recordings are broken. The downloadable video is available only in 160 x 128 resolution, and the quality is basic. Besides the video recording, students can also look at the images of the blackboard as used by Dr Herman. The Audio lectures also are available in downloadable and online streaming format. Downloadable files are in MP3 format. The quality of the audio recordings are not up to the mark, probably because the compression adversely affected the original quality. But, with some effort, the message can be comprehended. The accent would, probably, be the biggest hindrance for most students.

In conclusion, Dr Herman's approach of delivering a complete learning experience, by selectively using the available free resources on the Net, and the free resources offered by a publisher who doesn't offer the textbook for free, and by offering video and audio recordings of his lectures is an excellent example of exploiting the power of the Net to make education free. It is an ingenious idea and a commendable effort.

1.7 Learning Aids—Applets and Animations.

1.7.1 Physics Applets

(http://qbx6.ltu.edu/s_schneider/physlets/main/index.shtml)

This is the contribution of Dr Scott Schneider, associate professor of physics at Lawrence Technological University. On this page, Dr Schneider has offered Java Applets that can be used to better understand various physics concepts. The Java

Applets used to describe physics concepts are referred to as PHYSLETS.

There are over 100 Physlets on the site. Those interested in using the applets offline can follow the steps mentioned at the corresponding link on the site. It is recommended to go through the links under the “Introduction to using Physlets” title to be able to make the most of this site.

PHYSics appLETS (PHYSLETS)

son University by Wolfgang Christian. They are java applets that can be called
v contain physlets written or adapted for use at LTU by Dr. Scott Schneider.
lick here for more information [being updated - check back later] (or if you a
eb [being updated - check back later]).

Schneider's physics applets

Kinematics—One Dimensional Motion, Kinematics—Two/Three Dimensional Motion, Torques and Countertorques, Rotational Kinematics and Dynamics, Momentum—explosions/collisions, Optics, Harmonic Motion, ElectroStatics, DC circuits, and Magnetic Fields are some of the topics under which Physlets are available.

Some of the applets are not Dr Schneider's creation, and all these have been credited to their creators. Needless to say, the applets by themselves do not have any significant educational values, since without knowledge of the underlying concepts it would not be possible to make any fruitful use of the applets nor comprehend the results. Unfortunately, only a few applets are accompanied by a detailed explanation about the phenomenon shown. So a student would have to rely on another source of information to gain the basic knowledge to be able to optimally use the applets offered on this page. Some of the applets are part of a questionnaire, while the rest are sandbox type applications that allow the student to change different parameters and observe the changes.

Since applets only work when online, Dr. Schieder has created an application that allows the applets to be used even when

offline. This application and its usage instructions can be accessed from the link on the page. Unfortunately, the application is not selective and downloads all applets in one go without offering the user a choice regarding which applets to download. Once downloaded, the files are organised in folders. The applets can be launched by opening the index.html file in the main folder.

In conclusion, the collection of applets on the site are helpful if used in conjunction with regular educational material. These can increase the comprehension of a concept due to the ability to allow the user to experiment with the parameters. They are a good example of exploitation of the power of the internet to create a more lively learning environment.

1.7.2. Flash Animations for Physics

(www.upscale.utoronto.ca/GeneralInterest/Harrison/Flash/index.html)

This Web site is the creation of David M Harrison, Department of Physics, University of Toronto. It offers 89 Flash animations as learning aids. The animations have been categorised topic-wise, and some of the topics covered include Chaos, Classical Mechanics, Electricity and Magnetism, Nuclear, Optics, Quantum Mechanics, Relativity, Sound Waves, Vectors, and Waves.

The author has also offered tips on how to create animations in Flash, but this requires additional, paid software.

Flash Animations for Physics

ing *Flash* animations for illustrating Physics content. This page provides access to these animations. The animations will appear in a separate window.

category, and the file size of each animation is included in the listing. Also included is a list of the topics covered; the player is available free from <http://www.macromedia.com/>. The cat

Flash Animations for Physics

These animations are devoid of any explanatory notes, implying that they are targeted at other educators to be used as demonstrations in conjunction with relevant reading material. Nevertheless, students looking for additional material to better understand a concept will find the animations useful. Most animations are small in size, ranging from a few KB to a few hundred KB, with only one exceeding 1 MB in size. A brief description of the animation, its size, and the version of the Flash plug-in required to view the animation accompany each file. Most of the animations allow the user to change values and observe the changes, while a few are just for viewing. In any case, they are better at aiding comprehension than mere static images that exist on Web pages or in textbooks.

In conclusion, the lack of detailed explanatory notes takes away some of the value of this otherwise excellent site.

1.7.3 Maths, Physics and Engineering Applets

(www.falstad.com/mathphysics.html)

This site is the creation of Paul Falstad, who offers little information about himself. This self-effacement, though, only magnifies the utility of his creation. The site offers about 40 Java applets covering different topics in physics, like Oscillations and Waves, Acoustics, Signal Processing, Electricity and Magnetism, Statics, Electrodynamics, Quantum Mechanics, Linear Algebra, Vector Calculus, and Thermodynamics. Besides applets on these topics, the site also has links to other sites offering similar content.

A one-line description accompanies the link to the applet. Of the sites discussed here, this one probably offers the most well-crafted applets. The applets offer greater changeable parameters and overall appear sharper. It is easy to see that a physics student would be spending a lot of time on each applet trying out its different possibilities. Each applet is accompanied by brief instructions, and if required, even detailed instructions can be accessed

If you don't have Java, get the [Java plug-in](#).

Oscillations and Waves



Ripple Tank (2-D Waves) Applet

Ripple tank simulation that demonstrates wave motion, interference, diffraction, re



2-D Waves Applet

Demonstration of wave motion in 2-D.



3-D Waves Applet

Demonstration of wave motion in 3-D.



Coupled Oscillations Applet

Demonstration of longitudinal wave motion in oscillators connected by springs.

Flash animations for physics

by the link on the same page. Given the number of changeable parameters, the detailed instructions are sometimes necessary. Besides this link, there is a link to download the applet, and a few applets are also available as source code for download. Unlike other sites, the applets are not embedded in the page; rather, almost all of them pop up in a separate window.

One will not find educational material on the site to explain what the readings or findings of the applet actually mean. For this a student would have to lean on other sources of information, and revert to this site for experimentation purposes.

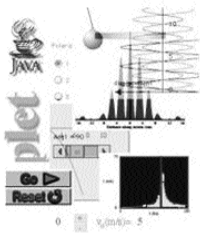
One irritating thing at this site is the presence of ads on many pages. Besides that, there is no information about the applet sizes, and one can only wait for the applet window to be launched. But, these can be easily forgiven given the superiority of the applets' educational potential.

In conclusion, this site with its excellent applets should be the first port of call for physics students needing learning tools to understand physics concepts.

1.7.4 The Applet Collection

(<http://lectureonline.cl.msu.edu/~mmp/applist/applets.htm>)

This is the creation of Dr Wolfgang Bauer, Professor, Department of Physics, Michigan State University. Like other sites in its genre, one can find Java applets on this site to aid the comprehension of physics concepts. There are about 60 applets here under topics like Kinematics, Dynamics, Rotational Motion, Oscillations, Thermal Physics, Wave Phenomena, Electrostatics, Electrodynamics, Optics, Quantum Physics, and Nuclear Physics.



The Applet Collection

These applets enable you to study simple physical systems in a playful way. They are idealizations of realistic scenarios, which follow the proper equations that also govern the real experimental systems.

Here is also a handy calculator (will open in a separate window):

Calculator

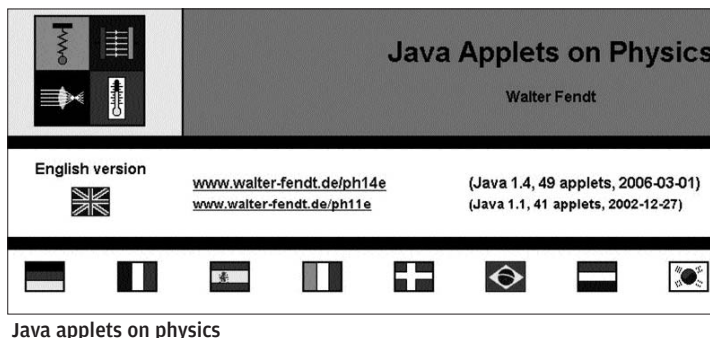
The Applet Collection

A brief online description of the applet accompanies the link. Clicking on the link takes the student to the applet page where directions on using the applet controls are also displayed. There is barely any additional information besides the directions, so students would not be able to comprehend the results unless they already have the knowledge about the phenomenon being demonstrated.


1.7.5 Java Applets on Physics

(www.walter-fendt.de/ph14e/)








This site is the creation of Walter Fendt, a high school maths, physics, and computer science teacher. The original page is in German and has been translated into over a dozen languages, including English, which speaks a lot about its utility. Some lapses in the translation process are easily noticeable though. Besides applets for physics, the author also offers applets in maths and astronomy.



Java Applets on Physics
Walter Fendt

English version

www.walter-fendt.de/ph14e
www.walter-fendt.de/ph11e

(Java 1.4, 49 applets, 2006-03-01)
(Java 1.1, 41 applets, 2002-12-27)

Java applets on physics

There are links to 49 applets on this page, and if required, a student can download all of them for offline use, through the separate download link. The page and applets are a bit too garishly coloured, but the learning potential is not hindered in any respect due to this.

There are applets on the following topics: Mechanics, Oscillations and Waves, Electrodynamics, Optics, Thermodynamics, Theory of Relativity, Physics of Atoms, and Nuclear Physics. The range and depth of topics covered by the applets makes it clear that they are targeted at high school physics students. Topics like Ohm's Law, Wheatstone's Bridge, Refraction of light, etc., which form part of a high school curriculum are explained well with the applets. This would also probably explain the author's attempt at using vivid colours everywhere. The applets are accompanied by brief instructions on usage, and a very few of them also have a small description of the phenomenon being demonstrated. The applets are comparatively simple, with few changeable parameters making it easier for young students to use the applet without feeling overwhelmed by too many controls.

In conclusion, the applets on offer here are a great opportunity for students to brush up their lab activities without having to visit one. The few lapses in translation are the only drawbacks of the site, though they do not obscure the author's words.

The constant theme that these applets convey is that it is possible to mimic the real-life environment in a laboratory, with computer animation. Interactive Java applets allow a student to play around with variables more conveniently and quickly than would be possible in a laboratory. This enhances the comprehension of the subject among students. From a teacher's point of view, the preclusion of the need to set up all apparatus before an experiment, and spend resources to maintain these apparatus and worry about damages caused by curious students, is a strong reason to invest in animations as a replacement for lab experiments. In the same vein, it needs to be pointed out that these animations are best used as repetitive learning tools. Even though the conceptual knowledge can be gained through an applet, the physical experience of handling instruments is important, and cannot be replicated on a computer.

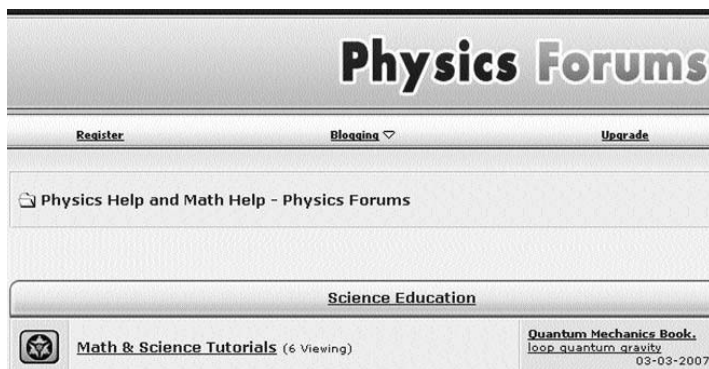
1.8. Discussion Forums And Newsgroups

Discussion boards / bulletin boards are places where like-minded people come to share their thoughts, seek assistance, and offer advice on a subject. These are places where students who require guidance on any topic related to the subject should head to. Due to the fact that the other members of the groups also share a passion for the subject, it is possible to get a sympathetic ear for your problems, besides knowledgeable advice. For someone who considers himself an expert on the subject, a forum is a great place to make a mark for oneself by solving problems faced by others. Besides helping others, a forum is also the place to share knowledge, and keep abreast of new developments across the world.

1.8.1 Physics Forums

(<http://physicsforums.com>)

This seems by far the most active of forums dedicated to the subject. Besides physics, the site also caters to a few other related subjects like maths, astronomy and engineering. The forum is well organised into sections and topics. The various sections include



The Physics Forums homepage

one dedicated to Homework / Classwork questions where students can seek answers to queries. There is another section on tutorials, where one can find links to sites offering educational tools. Besides these is the usual forum where people can discuss physics problems. A link on the top of the site, labelled “Links”, offers access to other information-laden sites on various subjects. While some of the links offer free e-books on the subject and cater to the physics student, there are others that offer research documents for download—like the link to Cornell University Library (arxiv.org) offering free access to about 4 lakh e-papers on various subjects.

This is a very lively site that seems to be frequented by, based on the user profiles, all types of physics lovers—students, teachers, physicists, etc. The forum is well-moderated, with questions in the wrong forum being moved to the proper ones, and unwanted posts deleted promptly. As is standard practice at most forums, only registered users are allowed to post or reply on the forum, while anyone can read through the posts. Unregistered members also do not have access to a site-wide search tool which would help in finding whether a query has been previously answered. Unregistered users are only allowed to search within a thread, which may not be of much practical use.

The site offers paid memberships, which increase the features of the site available to the user. While a comprehensive feature list

is not available on the site, a few of the benefits of a paid memberships include an e-mail ID and the ability to add a picture to one's profile. The core features of the forum remain free. While there were no visible ads on the site during our visit, the site does mention that free users are subject to ads. The ad-free look gives the site a professional touch.

Overall, physicsforums.com is an excellent area for physics lovers to connect with each other, share knowledge and help one another with problems. The homework help section is a great place for physics students to seek assistance with tricky problems that elude solution.

1.8.2 Physicsmathforums

(<http://physicsmathforums.com>)

Another budding forum catering to this subject is physicsmathforums.com. Besides physics, this site also covers maths, astronomy, and philosophy. The members are fewer compared to physicsforums.com, and the ads are conspicuous. Most of the sections are similar to that seen in the previous forum, like a section on homework help. But a few distinctions exist, like dedicated sections on physics frauds, and physics puzzles and brain-teasers.

1.8.3 Newsgroups

Those looking for more avenues to collaborate with like-minded physics lovers can try the sci.physics newsgroup. This can be accessed by going to groups.google.com and entering "sci.physics" in the search box. Newsgroups are similar to discussion boards, except for the lack of moderators. The nature of discussion and the quality of members are usually similar.

1.9 Eric Weisstein's World Of Physics

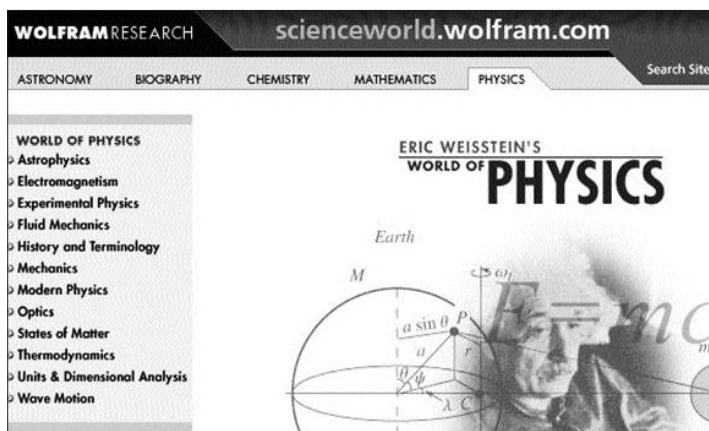
(<http://scienceworld.wolfram.com/physics/>)

Eric Weisstein, the person behind the Mathworld site (mathworld.wolfram.com), which is considered the most popular Web

site on that subject, is an encyclopaedist who has been gathering information on various topics since childhood. This site is a subset of Eric Weisstein's World of Science, which is the result of a decade of offline and online data collection by the author. Content on this site has also been contributed by others.

As this is the effort of an encyclopaedist and not an educator, one should not expect educational material in the standard textbook format. This is more of a reference site, with "2,700 entries, 14,065 cross-references, 172 figures, 22 animated graphics, 0 live Java applets, and counting..."

There are a lot of negatives about this site. For one, quite a few entries are mere placeholders with a link inviting the reader to contribute content. Unlike Wikipedia, another freely available enterprise of amateur encyclopaedists, this site doesn't offer anything beyond the bare definition, in most cases. Very rarely does an entry receive a description exceeding a few sentences. Of course, terms in the definition are linked to corresponding entries within the site, but that mars the visitor's experience to an extent, since there will be a lot of page hopping before a concept is elucidated. Some pages list a lot of references which are linked to the



Eric Weisstein's World of Physics

page in Amazon.com to buy the book. Certain entries that do not yet have a definition list a lot of references in a similar manner. And occasionally, one will come across an entry without definition, that has been linked to another similar definition-less entry. The prominent display of Wolfram's products in every page is also an irritant. There is a dearth of images, and the animations cannot be easily accessible while browsing through the site. The sole link to the animations exist on the first page of the site.

The redeeming factor is the presence of a search box which would be the preferred mode to get to a definition quickly. Overall, the site comes across as a work in progress, and is not worthy of being tagged along with its more famous counterpart, the Mathworld site.

1.10 Intute Physics Gateway

(www.intute.ac.uk/sciences/physics/)

Intute, as mentioned on the main page on the Web site, "is a free online service providing you with access to the very best Web resources for education and research. The service is created by a network of UK universities and partners. Subject specialists select and evaluate the Web sites in our database and write high quality descriptions of the resources. The database contains 115833 records."

Intute reviews Web sites covering every field of study, besides physics. The Physics section on the Web site offers resources on topics such as Acoustics, Atomic and Molecular Physics, Electricity and Magnetism, Fluid Mechanics, General Physics, Heat and Thermodynamics, Mathematical Physics, Measurement and Instrumentation, Mechanics, Statics and Dynamics, Nuclear Physics, Optics and Light, etc. Each of the topic headings is suffixed with the number of links categorised under it. Clicking on the topic link takes one to the listing of sites. Each site link is accompanied by a brief description of the site's contents. The sites are organised alphabetically. There is no comparative information

intute : science, engineering & technology

●● Intute > Science Engineering and Technology > Physics

Subject links

About us

A-Z of services

Internet catalogue

Search

Browse

New resources

Suggest a site

Internet training

Virtual Training Suite

Support materials

Physics

The Intute Physics Gateway provides free access to high resource has been evaluated and categorised by subject target audience is students, staff and researchers in high

Search in Physics

[Advanced search](#) [Latest resources](#) [Help](#)

Browse by heading

[Acoustics \[109\]](#) [Mather](#)

[Atomic and Molecular Physics \[76\]](#) [Measu](#)

The Intute Physics Gateway

provided about the sites, so it is not possible for a visitor to know which site is most popular or the largest among those listed.

A search box makes it much easier to identify the relevant Web sites, but the search is limited to the content of the site description rather than the sites themselves. Intute tries to rectify this situation by using what it calls a “Harvester,” a software that takes a sample of pages—which can go up to 100 pages—from each site and indexes them. It is possible that the terms that do not exist in the description may occur in the Web sites, and Harvester offers the opportunity, albeit limited, to improve the chances of finding the relevant sites.

An alternative way to use the Web site is through the “Subject Packs,” where Intute has organised the links to suit the educational requirements of student courses. The subject packs link is available on the right side bar. Besides physics, subject packs exist for chemistry and geography. Under the Physics Subject Pack the following topics are covered: Basic electricity, Capacitors and capacitance, Circular motion, Fundamental particles, Kinematics, Radioactivity, Relativity, and Vectors. As can be noticed, the coverage of topics is not as wide as at most sites on the subject. In this listing, the site description clearly mentions whether the site con-

tains lecture notes, or tutorials or glossaries. Clicking on the URL takes one to the Web page with the actual content. A summary look at the sites listed here confirms that they are of excellent quality.

Intute also has compiled a few interesting bits of information about science, which can also be accessed from the right side bar. The Timeline link tracks the important events that occurred across the years in the many branches of science. The “Science Data” link offers a Physics Reference Guide containing various formulae for download, as well as tables of important values and formulae related to circuits under the “Lessons in Electric Circuits” link.

There is a link to the “Virtual Training Suite” on the right sidebar. The intention here is to teach the user to find and use Web resources for education. While its purpose is not readily apparent, it eventually leads the user to a set of URLs offering information on the subject. These URLs have already been categorised by Intute, and are available to the user under each subject page. To start the Virtual Training Suite tutorial, a user must pick the relevant field of study, in our case this is “Physicist”. The only benefit of using the Training Suite is that the user can save links to important information laden sites, and e-mail these to himself for later use.

Overall, Intute offers an excellent filtering mechanism which greatly saves the student the time and effort involved in identifying good-quality information laden sites. It therefore fulfills its promise of providing access to the best Web resources.

1.11 Miscellaneous Sources

1.11.1 The Companion Website Resource

Major publishers of textbooks charge for the book and offer additional learning tools for free online. The additional content includes quizzes, animations, additional Web links etc. The term “Companion Website” seems to be commonly used to refer to the

STUDENT COMPANION SITE
Halliday, Resnick, Walker: *Fundamentals of Physics*, 6th Edition

Wiley Home | Higher Education Home | Title Home | Student Companion Site Home

Browse by Chapter

Select a Chapter ▾

Browse by Resource

- Interactive LearningWare Problems
- Solutions
- Problem Hints
- Programmable Calculator Instructions
- Jearl Walker: Essays

Student Companion Site

Halliday, Resnick, Walker: *Funda*

Welcome

Welcome to the Web site for ***Fundamentals of Physics*** by Robert Resnick and Jearl Walker. This Web site o

The Student Companion Site for Fundamentals of Physics

site offering this content. One will not find any reading material on this site, so students have to use other sources to gain the minimal knowledge about a concept.

A brief description of what to expect at a site has been covered in section 1.23, where the Wiley.com companion site was discussed. Other publishers like Prentice Hall also follow in the same footsteps. While we shall not be reviewing companion sites in this section, we would like to offer a tip so that these Web sites can be easily accessed. Those well-versed with Internet search techniques would have already arrived at the solution, but for the rest, to get to a Companion Web site, just head to google.com and search for the title or author of the book along with the terms “companion” (or “companion site” in case a lot of irrelevant results show up). For example, if you are looking for the companion site for the book *Fundamentals of Physics* by David Halliday, Robert Resnick, and Jearl Walker, in the Google search box, type in “companion Resnick” (without the quotes) and you should get the link to the relevant site. Of course, typing in “companion physics” will result in links to all companion sites of all books on physics by all publishers. A bit of rummaging would be required in that case.

1.11.2 Lecture Notes and Textbooks

Many sites offer simple lecture notes and downloadable textbooks:

1. Peter Suranyi, Professor Emeritus of Physics, University of Cincinnati. Lecture Notes on Modern Physics (http://physuna.phs.uc.edu/suranyi/Modern_physics/Lecture_Notes/lecture_notes.html)
2. University of Winnipeg, Distance Education Program. Lecture notes on Introductory Physics.
(<http://theory.uwinnipeg.ca/physics/>)
3. Three free downloadable books by Professor Frank Firk, Former Chairman of Dept of Physics, Yale University
(www.physicsforfree.com)
4. World of Physics
(http://library.thinkquest.org/20138/ch_indexSt.html)
5. Kerala State Board Standard X Physics Text book
(www.education.kerala.gov.in/eng_phys.htm)

Chemistry



Chemistry is a royal pain for many. Nevertheless, it doesn't cease to fascinate. Some of the most important discoveries of the twentieth century had a strong basis in chemistry. OK, you may not be aspiring to the height of a new discovery, but you do want to get a handle on the subject—enough to score well in your exams! Whatever be your need—whether you're a lab rat or just looking for better study material—this collection of links will give you all the info you need.

Chemistry—The Wikipedia Entry

<http://en.wikipedia.org/wiki/Chemistry>

Wikipedia needs no introduction. The Chemistry entry on Wikipedia will give you a good overview of the subject. This will help you keep The Big Picture in mind as you delve into the details.

An Introduction to Chemistry

<http://preparatorychemistry.com>

This well-organised site is the online version of the textbook *An Introduction to Chemistry* by Mark Bishop. Maintained and hosted by the author, the site is packed with tons of animations, tutorials, checklists, PowerPoint presentations, chapter maps, glossary quizzes, and “user-manipulatable” 3D representations of molecular structures. The content is primarily for students starting out on a college course in chemistry with no real background in the subject, but we feel this will be a good companion text to those who are tackling the eleventh and twelfth standard board exams as well.

The text comes in two versions—a “chemistry first” version and an “early conversions” version. The content remains the same, but with some rearrangement of the order of presentation. In the “chemistry first” version, mathematics-related topics have been pushed to later on in the book (chapter 8 and beyond), while the “early conversions” version treats those topics earlier in the book. You choose which version to go for, but the author stresses and favours “chemistry first.”

The site, as you can see from the screenshot, is organised into tabs on the top and links on the left sidebar. Both the tabs and the sidebar links take you to almost the same set of topics.

The textbook has been broken up into chapters which are downloadable PDFs. Additionally, each chapter has a “Concept Map” and a Study Guide PDF, which you can download separately. The concept map is a single-page diagram that encapsulates the concepts learnt in the chapter and their relationships. This makes it convenient when you want to revise and review your under-

standing of the chapter without having to run through the whole PDF again. Another quick refresher tool is the Chapter Map. You can click on the map for each chapter and do a mental self-check on your knowledge in each of the areas.

Many of the chapters are further illustrated with animations. You will need the Shockwave plug-in to view these animations, and also the Java Runtime Environment if you want to view or play with the 3D molecular structures. Similarly, many of the chapters also have animated tutorials which test your knowledge and provide you some level of guidance in your learning. In fact, the animations themselves could also be considered as tutorials in themselves as they expand on different aspects of each topic being discussed.

One useful learning aid is the chapter-wise checklist. Each of the chapters have a list of actionable points which you can tick off as you achieve each of the stated objectives. This will help you stay focused on completing each of the requirements for each particular chapter.

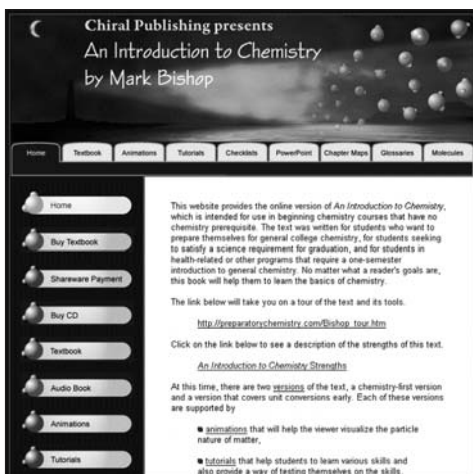
Other than the early conversions and the chemistry version, there is also an audio book version. Unfortunately, you won't be able to save the audio files to disk and copy it to your MP3 player, as the audio is only streamed from the site. There is a way to get the audio version though. But before we tell you how, a quick word on the PowerPoint versions of each chapter.

Each of the chapters can also be viewed as a PowerPoint version. This is a condensed version of the site and provides you less details than the text or audio book and more details than the concept maps, chapter maps or study guides. One point to note though—you don't need PowerPoint itself to view these files. Confused? Well, the PowerPoint slides have been converted to two formats—PDF or MHT (Web Page Complete). The PDF will of course open in Acrobat Reader, the MHT files will open in Internet Explorer, and will allow you to navigate the chapter with relative ease.

Note however, that each of these versions are aids than replacements for the textbook. Take the time to read through the text and avoid skimming!

Finally, how to get the audio version of the text that you can then transfer to your portable audio player. You will need to (no surprises here!) buy the CD version of

the Web site. Additionally, if you are constantly referring to the site and find it really useful, the author requests a \$20 (Rs 900) donation.



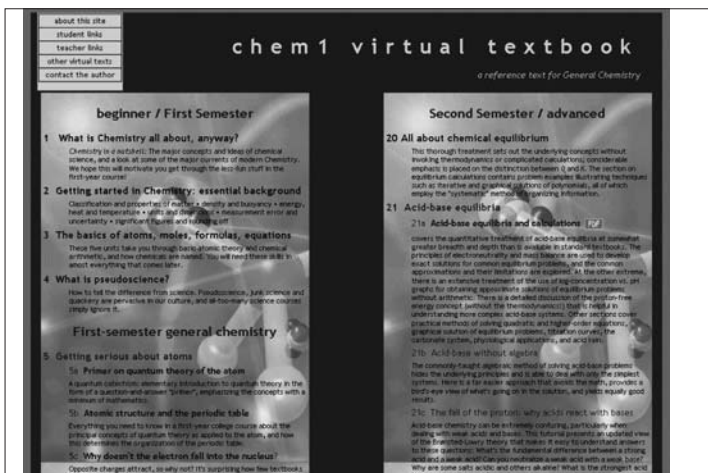
Online Introductory Chemistry Textbook

Chem1 Virtual Textbook

www.chem1.com/acad/webtext/virtualtextbook.html

Like Bishop's introduction to chemistry, Chem1 is another excellent online chemistry textbook. Created, owned and maintained by a retired professor of chemistry, Chem1 is not just an online version of a physical textbook. There is a clear distinction when compared to the objectives of Bishop's book. Chem1 tries to be more than just an exam-oriented, syllabus-driven book. The approach is to provide all the information regarding chemistry and its study in a single site and unlike Bishop's site, Chem1 is constantly being updated and revised.

The homepage is linked to different sections and chapters, as in the screenshot. Again, like Bishop's, the site tackles college-level chemistry starting with an introduction that assumes no prior knowledge. The interface may look a bit dated but the content is pure gold! The text is crisp and easy to read and just as easy to understand. Most of the pages are organised as HTML pages, so they



Chem1—Virtual Chemistry Textbook

are easy to browse and read through. However, some of the older material is still in PDF format and has not been converted yet.

The sections are organised with a rough chronological correspondence to what you would expect in each semester of study. While this is based on the Canadian education system, it will not be radically different from the Indian system—at least in terms of the subject matter you are expected to learn in each year of study.

In addition to the study text, there are resources for students which can be accessed from the homepage by clicking on the “student links” link. This page has a wealth of resources that will keep the chemistry student fully occupied for hours on end! It contains links to other sites dealing with all aspects of chemistry and its study. There are links to other virtual textbooks, lecture notes, high school chemistry courses, downloadable lecture videos plus exam oriented information—including a very useful “How to Pass Chemistry” guide. Similarly, you can send your teachers to the “teachers links” section for a wealth of information that will help them in teaching chemistry!

Introductory University Chemistry Course

Part 1: www.intute.ac.uk/sciences/reference/plambeck/chem1/ua101.html

Part 2: www.intute.ac.uk/sciences/reference/plambeck/chem2/ua102.html

This site is a bit more advanced and requires students to have some level of background in chemistry before attempting the course. The course is split into two parts and both are available online.

Unlike Chem1 and Bishop's site, this course is a bit more traditionally organised: you are presented with the text and notes, in sequential chapters, and you are expected to read them. There are no supporting animations or tutorials though images are used where relevant. As with any university level course, you are expected to use your own judgement and do any background reading if required. A few exercises are scattered in between the various chapters but these are primarily to quickly check your level of comprehension of what you have learned rather than being a learning aid.

The notes are good quality, and are presented in a straightforward style that keeps you focused on the concepts under discussion. Navigation is not so easy, so you may want to keep open a Custom Search Engine for this site (see our *Fast Track to Google* to learn how to do that). You can then quickly switch over to the other window (or tab) to run your queries when you want to search for previous references to the topic.

The site, however, does provide with one very useful tool: Mock Exam Papers. Unlike Indian standards, passing score is considered to be 50 per cent, and you need at least 65 per cent to consider yourself satisfactorily proficient in the subject. Which means, realistically, you should be aiming to ace the papers. The instructions are quite clear: print out the question paper, keep blank sheets of paper ready, and hit the stop watch. Complete the exam in the specified number of hours and then

click on the answer sheet to see answers to each question. Score yourself and find out how you fared. As the site says: looking at the answers or studying the questions before preparing for the exam will not give you an accurate picture of your learning. So, no peeking. Finish the course and then take the exam. Ace the mock exam and wow your pals with your chemical wizardry!

ChemWeb 2000

<http://library.thinkquest.org/19957/>

ChemWeb 2000 is closer to Chem1 in its ideals, as it is designed to be an all-in-one chemistry-focused resource suited for both the beginning chemistry student as well as the advanced learner. ChemWeb is part of the ThinkQuest Library that features over 6,000 sites on various topics for students of all ages.

The site is fairly simple to navigate and browse. The information has been simplified for easy readability and understanding, and you can use this site to get a quick grasp of some basics if you are strapped for time and in a hurry.

The home page has all the various topics organised on the left sidebar. Clicking here on a topic will take you to the topic's page with additional links to various subtopics that make up the main topic. This is fairly easy to follow, but if you want to go to the page for a sub-topic (or a sub-sub-topic) the homepage won't help. You will need to the search engine provided to pull out "deep links." Again, you may be better off making a Custom Search Engine to navigate the site.

The site also has a quick tutorial to help you learn how to the use it. While it is not so relevant these days given the penetration of the Web into our lives, it is still useful especially for those who are venturing into online learning environments.

Also don't forget to check out the various links to other sites on chemistry. Some of the links are dead, but you are sure to find some useful information.

One nice touch is the videos on chemistry experiments. Other than the entertainment value, you will also get to see other students who get their kicks from doing crazy chemistry experiments! Be careful though: don't blow up the lab! To view the video clips, you will need the Real media player or any .rm-capable media player (look up our *Fast Track to Freeware* for recommendations on Real Media capable players).

Guide

www.chemguide.co.uk

Chem Guide has a pretty comprehensive coverage of all the topics that form part of the course requirement. Again, this is a topic-organised site and not chapter-oriented, so the emphasis is on learning rather than finishing prescriptive coursework. The entire site is HTML-based with minimal use of graphics, so even if you are on a dial-up or a low speed shared connection, the pages should appear quite quickly.

The topics are organised in a standard drill-down hierarchy, which may seem slightly old-fashioned given the rich interfaces prevalent these days. However, the inclusion of the Google site search widget more than makes up for the clunky feel. As with other similar sites, we recommend you keep the search page open in a separate window or tab and switch to that when you want to search for something.

The site is useful for both the regular chemistry student as well as for those who wish to appear for UK-based exams. Other than the information provided on the site, you also get textbook suggestions for further reading. In addition, there are links to revision texts and exam-oriented practice papers.

Chemistry Animations

www.klte.hu/~lnteg/animate.html

One of the biggest problems with learning chemistry is the difficulty in translating all those equations and chemical names into something that has practical application. A crucial part of

understanding a concept involves the ability to see a real-world application. Given the limitations that our schools and colleges operate under, it may not be possible to demonstrate each and every chemical property. So we go for the next best thing: Chemistry Animations.

This page is a collection of links to animations and videos on chemistry that demonstrate various chemical reactions and theories. They range from the simple—like how partial vacuum pressure can crush a 200-litre drum—to more esoteric reactions like the Briggs-Rauscher Reaction. There are links to nearly 200 animations and/or videos on a wide range of topics.

Note that the site does not host the links themselves. However, you get a easily readable table that gives the name of the experiment, the source or link, and the file type of the animation. The links are mostly to university sites.

World of Chemistry

<http://scienceworld.wolfram.com/chemistry/>

A textbook is good when you have a prescribed course of study. As the quantity of information grows, however, you will find yourself wishing for a reference guide that will help you quickly refresh the concepts you have either forgotten or are having trouble remembering clearly.

World of Chemistry is one such site. This is an encyclopaedia-style site with sections organised around the usual general chemistry classifications, but also including advanced subjects such as petrology. Click on any main heading and you will be presented with drill-downs of various sub-topics under each category, which you can then further drill into till you reach the definition for each topic.

The only drawback is that the number of entries is not really large.

World of Molecules

www.worldofmolecules.com

Chemists have often argued that the entire foundation of modern twentieth-century civilization is based on discoveries in chemistry. Browsing through the World of Molecules, you can be almost convinced of their claim that the twenty-first century is going to be defined by “significant progress in ... molecular computing, genomics ...” and so on. If you’ve ever wondered about, or if you want to investigate, the details of any molecule, the World of Molecules is the place to start.

The site has both articles on molecular chemistry as well as a Molecules Database. The content is suitable for intermediate and advanced learners: any serious use of this site would require some level of understanding of the chemistry involved. The database is classified according to various types of molecules ranging from Food Molecules, Fuel Molecules and even the Molecules of Emotion.

From the Directory of Elements box on the right you can select any of the elements of the periodic table to get a detailed description of the element. This includes its position in the periodic table, general characteristics, atomic, physical and electromagnetic properties as well. Also, depending on the type of element some historical details of the element may also be included. For example, in the entry for the element Zinc, we learn that it has been used since ancient times.

World of Molecules

Foods Antioxidants Supplements Life Emotions Disease Drugs Pesticides and Insecticides Solvents Fuels

Today is Thursday, March 8, 2007

Just as the 20th century was marked by the development of electricity, telephones, aviation, computing, and private motor vehicles, the 21st century will be marked by significant progress in a broad spectrum of technologies, among them: molecular computing, genomics, rational drug design, and alternative energy. What will be common to all these new technologies? They will all be possible because of a greater understanding of The World of Molecules.

Featured Molecules

The Nanoscale

Carbon nanotubes (CNTs) have imagination of scientists for even superconductors to transistors or strengthening, ion storage for batteries.

FEATURED EDUCATIONAL RESOURCES

Introduction to Molecular Modeling (china version) - Here is an excellent activity that has been well tested in K-12 classes. It will introduce students to simple molecular structure and how to use the necessary software. There are three parts to the lab which will take approximately 2 periods to complete. [Part I](#) - [Part II](#) - [Part III](#). This activity requires that you computer has the plugin (time rotated).

Introduction to Molecular Modeling for (Jmol version) - This is the same activity as above but uses the Java applet Jmol. It only requires that your computer is Java enabled? [Part I](#), [Part II](#), [Part III](#).

Explain It With Molecules NEW - Why does ice float? - How does soap work? - Why is diamond so hard? - Why do carcinogens like nicotine cause cancer? - Why is a salt crystal cubic in shape? - This is an interactive activity using the Jmol applet which allows students and teachers to interact with molecules. No plugin is needed.

Carbon 3-D online NEW - What are the different molecular structures of carbon? See them in 3D. This paper requires that Chrome is used.

What is the relationship between molecular modeling and mathematics? - Jmol version. [Part I](#) - 1 Dimension, 2 Dimensions, 3 Dimensions - [Part II](#) - Angle and Distance Measurements - [Part III](#) - Crystal Structures.

Directory of Elements

Select Element

For a Periodic Table

Database of 3D Structures

3-D STR

Selected Resources

The Molecular Web!

You can also view 3D Molecular Structures of various molecules. These are static images but if you do want to view them as “rotatable” 3D structures, you can download the 3D file and a viewer. There are two options for the viewer: the Chime plugin and Cosmo Player 2.1. Both are freeware, and links are provided to the locations from where you can download them.

There are interactive tutorials that ask you to participate in simulated experiments online and guide you through the steps involved while providing you with clear, concise explanations of the various phenomena. For example, the explanation of molecular modelling is made so much more simple and easier to understand with the use of interactive Java applets that you can manipulate.

Organic Chemistry Helper

www.chemhelper.com

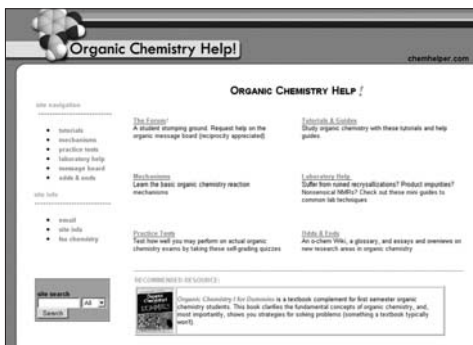
If the thought of studying organic chemistry gives you the shudders, this site should give you some respite. It is a thoughtfully laid-out site focused on organic chemistry and nothing else. It is divided into six main sections: tutorials, mechanisms, practice tests, laboratory help, a message board, and odds & ends.

The main attraction of this site is the message board. The bulk of the activity takes place in the forums, and if you have a doubt or want some clarification on an organic chemistry question, go ahead and post your query. Somebody is sure to bound up and reply sooner than later.

The tutorial section is pretty dismal: it has only one tutorial. But there are eight Quick ‘n’ Dirty Guides on a variety of subjects of interest in organic chemistry. The Mechanisms section is somewhat better, with descriptions for about 15 chemical mechanisms ranging from Free Radical Halogenation to the Diels-Alder Reaction.

The practice tests section is still better, though this is designed more as a subject knowledge review test rather than conforming

to any syllabus-oriented exam model. Each test consists of questions with multiple choice answers. A Hint button is provided. Click on it and you will get a pop-up dialog with details of the answer. Once you complete the ques-



Get your Organic Chemistry right

tions, you can click the submit button and get a grading for the test with details of the correct explanation of the answers you got wrong.

Like the tutorial section, the Lab Help section and the Odds & Ends section are also pretty thin. However, there are some useful material there that should help you in the lab. Odds & Ends seems to be promising, and hopefully the author will update the content and provide us access to more than just the topic headings!

Chem4Kids

www.chem4kids.com

Chem4Kids is not just for kids. Anyone with an interest in learning chemistry will find the site useful. That said, college students may find the treatment somewhat basic. The material, however, is presented in an informal style that conveys the concepts easily.

The site is organised into six sections: Matter, Atoms, Elements & Periodic Table, Reactions, Biochemistry, and Etcetera. On whichever page you are, you can quickly switch to any of the other sections by scrolling to the bottom and selecting the required section. On the left of the page there is a complete list of links that show the various topics within each section. This is especially useful when you want to read with a plan to finish a particular section in a given amount of time.

At the end of each section, you can also take a quiz to check your understanding of that particular section. The quiz is again a knowledge-oriented quiz rather than a “performance”-oriented one. The emphasis is on helping you verify that you have understood the concepts. At the end of each topic

• MATTER
• ATOMS
• ELEMENTS
• REACTIONS
• BIOCHEMISTRY
• ET CETERA

WELCOME TO...
CHEM4KIDS!
RADER'S

[MATTER](#) | [ATOMS](#) | [PERIODIC TABLE](#) | [ELEMENTS 1-36](#)
[REACTIONS](#) | [BIOCHEMISTRY](#) | [ET CETERA](#)

[Ads by Google](#) | [Chemistry Quiz](#) | [AP Chemistry](#) | [Biod Chemistry](#) | [Chemistry Book](#)

WELCOME TO CHEM4KIDS

Thanks for visiting! Right now, you're on CHEM4KIDS.COM. If you are looking for basic chemistry information, stay on this site. It's not just for kids, it's for everyone. We have information on [matter](#), [atoms](#), [elements](#), the [periodic table](#), [reactions](#), and [biochemistry](#). If you're still not sure what to click, try our [site map](#) that lists all of the topics on the site. If you surf and get lost in all of the information, use the search function on the side of the pages.

OKAY! As we have for nine years, let's start here...

Chem4Kids—Chemistry made easy

or page there is also a list of related links that takes you to other pages or sites that give you more details about aspects that are indirectly related to the subject matter on the page. For example, after reading the overview of Matter, at the bottom of the page you will find related links on topics such as The Scientific Method. These are not part of the Chem4Kids site, but are nevertheless important concepts. In addition, you have real-world examples arranged in alphabetical order. Each of these examples have some connection to a physical phenomenon, and a brief explanation of the example is given along with a list of related links that explain in greater detail how it works. A basic glossary is also available that gives details on various chemistry-related materials and concepts.

Chemistry Tutorials & Drills

www.chemistry-drills.com

Chemistry Tutorials & Drills is another site that offers some tutorials and practice tests (drills) on various chemistry topics. According to the author the site is an ongoing effort, so you can

expect updates. Currently the site offers tutorials and practice tests on recognition of organic functional groups, VSEPR Geometry, and balancing chemical equations.

The balancing equation drills are particularly interesting as you can try out different problems at different levels of expertise: Easy, Hard, Expert, A-Level AS, and A-Level A2. There are 1,270 chemical equations that you can practice with and hone your equation balancing skills.

Test your Chemistry

The Chemistry Thesaurus

www.chemthes.com

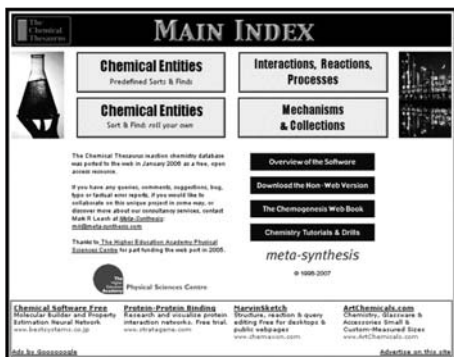
This is a reaction chemistry database with a style somewhat different from the thesauri that are companions to language dictionaries. The original meaning of the word thesaurus is “storehouse,” which is closer to the real meaning of what the Chemistry Thesaurus is. Traditionally, finding the relevant chemistry reaction information between different areas of organic and inorganic chemistry is difficult. The Chemistry Thesaurus can be considered an information warehouse with different types of chemical species and their chemical reactions, interactions, and processes. It is available both as a downloadable version and online.

The Thesaurus allows you to jump from chemical to chemical, tracing the path in the synthesis of a chemical via its reactions, interactions, and processes. You will thus get an end-to-end view of how a particular chemical compound is synthesised through the use of various intermediary compounds and by-products before it gets to its final state.

The site is organised thus: there is the main index, a list of chemical entities, data on the chemical entities, list of interactions, reactions and processes, data on the interactions, reactions and processes, list of mechanisms, and collections and data on the mechanisms.

The main index allows you to explore from four different angles.

- Search for chemical entities using pre-defined search criteria
- Search for chemical entities using your own search criteria
- View over 800 pages of chemical interactions, reactions and processes—expand any reaction chain to see its data page; and
- View the interactions, reactions, processes as mechanisms or collections—you can click on any mechanism or collections and see the complete list of interactions, reactions, processes classified under that mechanism or collection



Chemistry Thesaurus—Comprehensive chemical reaction information

The database is not a comprehensive compendium on reaction chemistry; rather, it is a broad look at the length and breadth of the “reaction chemistry space.” It is designed for advanced chemistry students looking for an easy way to get at reaction chemistry information available in textbooks.

The Chemogenesis Web Book

www.meta-synthesis.com/webbook.html

Chemogenesis is a new kind of analysis that looks at chemical structure and reactivity from the point of view of how it emerges from the periodic table of elements. Chemogenesis tries to build the story of chemistry from the point of view of its history. It assumes the starting point as the nucleosynthesis of chemical elements inside

stars, which is followed by discovery of these elements (by humans) and the formation of theories (classical and quantum) that attempt to define our understanding of the chemistries involved.

The site starts with the basic concepts behind chemistry or chemical science: “nucleosynthesis, the periodic table, electronegativity, binary materials & why reactions occur.” It then explains the chemogenesis analysis and goes on to explain other important elements of chemistry like chemical systems and structural systems.

While the treatment of the subject of chemistry on this site has nothing to do with any academic syllabus, the Chemogenesis site is nevertheless a useful tool that can help students understand reaction chemistry and its causes (and effects) in a more complete or holistic manner. Again, beginners may find the site a bit overwhelming, but advanced students shouldn't have any problem imbibing the contents.

Chemistry: Afterburner

This section is for chemistry nuts and lab rats...

Chemical Blogspace

<http://wiki.cubic.uni-koeln.de/cb/index.php>

If you were feeling a bit left out of the blogging craze because of your passion for chemistry, perk up! The Chemical Blogspace is devoted entirely to chemistry. Everything from blogs, publications and more. This is the watering hole you will want to hang out at if you are planning a career in chem-



Chemical Blogspace—Watering hole for lab rats

istry or are just on the alchemists' trail of changing common lead into gold! The site is well-designed, and has a lot of contributions from many chemists and chemistry enthusiasts. It has some nice visual features like blog clouds and the like, and the best part is, nearly everything has an RSS feed.

High School Chemistry Resources on the Web

www.chemistrycoach.com/high2.htm#The%20Chemistry%20of

While the site specifically states that it is high-school-oriented, this huge collection of links does not limit itself to just high school material. You have links to all kinds of chemistry-oriented Web sites that do include both academic (both school and college level) oriented sites as well as general interest sites. You have links to various sites that provide you help with chemistry, sites that explain the chemistry of many things like acid rain, emotion, smell, etc., tutorials, online tests, lab tests, simulations, and more. Be prepared to spend hours!

The Periodic Table of Elements

www.chemsoc.org/viselements/pages/pertable fla.htm

www.touchspin.com/chem/DisplayTable.html

There are literally hundreds, if not thousands, of versions of the periodic table on the Web. You will be hard pressed to decide on which to use, as the differentiators are largely a matter of personal preference. Two liked are the Flash version of the periodic table from Chemsoc.org and the interactive table from touchspin.com.

The first is more visually appealing, and clicking on an element will take you to an overview of that particular element. An additional click is required to view the chemical data in either HTML or PDF format.

The interactive version is not so polished, but is choc-a-bloc with information regarding the element. Clicking on an element will take you to the Wikipedia entry for that element, which is fairly exhaustive as compared to the Flash version from Chemsoc.org.

Chemistry Freeware Links

www.sciencegeek.net/Chemistry/chemware/chemware.shtml

This site contains links to many chemistry and science oriented freeware that are helpful to students. For example, you can jump to the site that hosts the Chime plug-in, which we've discussed earlier. Chime allows you to view and manipulate molecular structures in 3D.

Another interesting freeware is the Orbital Viewer software with which you can create orbital animations of atoms and electrons. In addition, you can make cutaways, light the orbital, make shadows, show locations where the probability drops to zero, as well as save the results as image files in many formats from BMP to VRML.

You can view animations of important chemical principles with the ChemLand collection of Shockwave files.

For those of you who write chemistry reports on your word processor and are wondering how to add all those chemistry symbols without leaving a space and then manually entering them by hand, use *The Royal Chemistry's TrueType Font*. This font contains all the chemistry symbols which you can then use as required in your word processor. The only limitation is that you cannot "embed" the font—for example, when converting to PDF. The user who reads your document will need to install the fonts separately before being able to read your documents.

If you're looking for molecular modelling software, don't forget to check out www.edinformatics.com/mathmol/mm_software.htm.

MIT OpenCourseWare | Chemistry

<http://ocw.mit.edu/OcwWeb/Chemistry>

Have you ever wondered what they teach at the world's leading and prestigious scientific institution—The Massachusetts Institute of Technology (MIT)? Well, with the OpenCourseWare initiative,

you can get access to the lecture notes and syllabus that chemistry students at MIT use.

The OpenCourseWare (OCW) initiative is a free and open educational resource made available by many universities around the world. The one

thing to note is that the OCW is not a formal degree or certificate-getting process. You can supplement OCW with your regular work to get high-powered insights into your area of study, or just take a course because of your passion for the subject.

MIT OPENCOURSEWARE
OpenCourseWare

Search

3.04 Principles of Inorganic Chemistry II, Fall 2004

Course Name

- Syllabus
- Calendar
- Readings
- Lecture Notes
- Assignments
- Exams
- Discussion Board

Course Meeting Times

Lectures: Three sessions / week
1 hour / session

Recitations: One session / week
1 hour / session

Level: Undergraduate

Feedback: Send Feedback about OCW or this course.

Carbon monoxide (CO) is a π -accepting ligand. The bonding of CO to a metal has two components: σ -bonding and π -backbonding. (Illustration by MIT OCW.)

Highlights of this Course
This course features a full set of [lecture notes](#).

Course Description
This course provides a systematic presentation of the chemical applications of group theory with emphasis on the formal development of the subject, and its applications to the physical methods of inorganic chemical compounds. The electronic structure of molecules will be discussed. Against this backdrop, the optical, vibrational, and magnetic properties of transition metal complexes are presented and their investigation by the appropriate spectroscopy is described.

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MIT OCW—Chemistry courses from world leading universities

You will not get “formal” access to the MIT faculty through OCW, but you do get access to actual courses (lecture notes, online textbooks, etc.) conducted, and associated assignments and exam papers. You can also use the discussion groups to help you in your studies and get feedback. However, don’t expect it as your due. Be courteous; the teachers / professors who may respond will not necessarily belong to MIT—they are drawn from the worldwide teaching community participating in the OCW project, and they are devoting their time to the project for free.

Biology



Biology class can be fun—and no, we don't mean giggling at all the diagrams. It's also pretty unforgiving at exam-time—fudge the name of an enzyme or relocate body parts in a diagram and you'll be looking at generously awarded zeroes on your paper. If your textbooks are boring (of course they are), you can turn to the Web for a more fun way to learn about Life, the Universe and Everything.

3.1 Lessons Online

In this section, we'll feature sites that are practically textbooks themselves. However, since they're not Indian, they may not follow your syllabus to the tee, but will nonetheless be useful side-by-side with your own textbooks.

3.1.1 An Online Biology Book

(www.estrellamountain.edu/faculty/farabee/biobk/biobooktoc.html)

Hosted by the Estrella Mountain Community College in Arizona, the Online Biology Book is more or less a transcription of college lectures by M J Farabee, professor at said college. Needless

to say, the book covers college-level topics, ranging from the innards of the cell to ecosystem dynamics and the reasons behind mass extinctions. The content was last revised in late 2001, which is acceptable, considering that Nature isn't going to change its ways in six wee years. The pages are in simple, no-frills HTML, and we must give it a brownie point or two for the well-executed diagrams—they're neat, clear, and quite self-explanatory. Each chapter comes with images, links and cross-references, and links jargon to the glossary.

Online Biology Book

Welcome to an On-Line Biology Book Table of Contents. Click on the underlined items to go to those chapters. The text items are modified later editions I have developed over 4 years of teaching college level introductory biology. Use of any text for educational purposes is encouraged and appreciated. However, many illustrations are taken off the web, so I have indicated the source page, unless that page will be an active link) and tried to provide a link back to the original. In addition, several comments have been previously alerted me to use dark images. If you are desiring to use these images, your e-mail contact (farabee@estrellamountain.edu) would be appreciated.

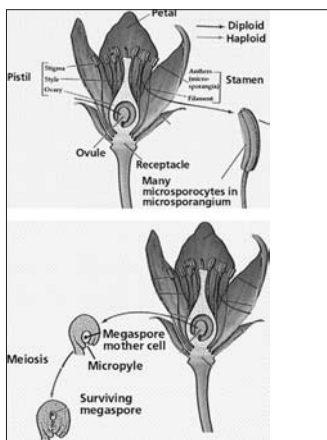
NOTES: These pages have been recently (2/97) revised and updated. Please let me know your thoughts (farabee@estrellamountain.edu).

We have been very popular: over 400,000 visitors between Jan. 1, 1999 and September 17, 2001. Thank you!

On-Line Biology Book: Table of Contents

1. INTRODUCTION: THE NATURE OF SCIENCE AND BIOLOGY (REVISED 6/21/01)
2. CHEMISTRY I: ATOMS AND MOLECULES (REVISED 6/19/01)
3. CHEMISTRY II: WATER AND ORGANIC MOLECULES (REVISED 6/19/01)
4. CELLS I: ORIGINS (REVISED 6/19/01)
5. CELLS II: CELLULAR ORGANIZATION (REVISED 6/19/01)
6. TRANSPORT IN AND OUT OF CELLS (REVISED 6/24/01)
7. CELL DIVISION: BINARY FISSION AND MEIOSIS (REVISED 6/21/01)
8. CELL MOTION: MITOSIS AND SEXUAL REPRODUCTION (REVISED 6/21/01)
9. LAWS OF THERMODYNAMICS (REVISED 6/24/01)
10. REACTIONS AND ENZYMES (REVISED 6/24/01)
11. ATP AND BIOLOGICAL ENERGY (REVISED 6/19/01)
12. CELLULAR METABOLISM AND FERMENTATION (REVISED 6/21/01)
13. PHOTOSYNTHESIS (REVISED 6/24/01)
14. INTRODUCTION TO GENETICS (REVISED 6/21/01)
15. GENE INHERITANCE (REVISED 6/21/01)
16. DNA AND MOLECULAR GENETICS (REVISED 6/24/01)
17. HUMAN GENETICS (REVISED 6/21/01)
18. PROTEIN SYNTHESIS (REVISED 6/24/01)
19. CONTROL OF GENE EXPRESSION (REVISED 6/21/01)
20. PLANTS AND THEIR STRUCTURE I (REVISED 6/21/01)
21. PLANTS AND THEIR STRUCTURE II (REVISED 6/21/01)

The Online Biology Book makes no pretences



The Biology Book's collection of images—both self-generated and external—is excellent

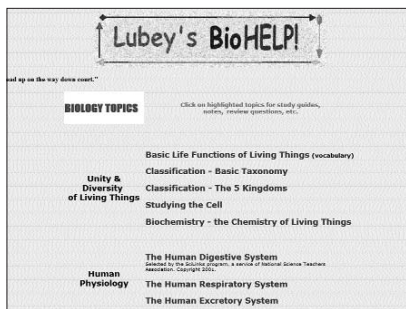
3.1.2 Lubey's BioHELP!

<http://users.adelphia.net/~lubehawk/BioHELP!biotopcs.html>

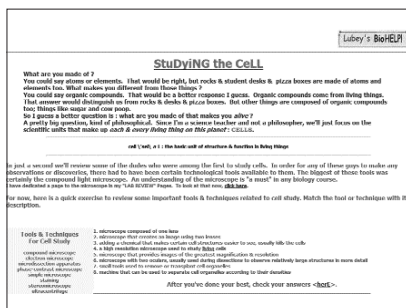
Written by Steve Lubey, a former Biology teacher, this site is designed for high school level students, though isn't comprehensive by far. For what it does cover, though, it delivers well with simple language and covers most of the basics.

If you're looking for a crash course in Genetics, this site is amazing. All the chapters under the Genetics section are written in a simple, mildly funny style, complete with diagrams that look (and probably are) hand-drawn. At the end of every lesson, or every concept if lessons are large, is a quiz—a quick objective-type round-up of what you've learnt thus far.

Unfortunately, while Mr Lubey knows his biology, nobody taught him the principles of Web design. He seems to be one of those people who can't say "fun" without using the Comic Sans font. Pair this with some poor choices of colour, and you have a fairly off-putting site, were it not for the content.



Not the most well-designed site, but Lubey's BioHELP! is well organised and easy to follow

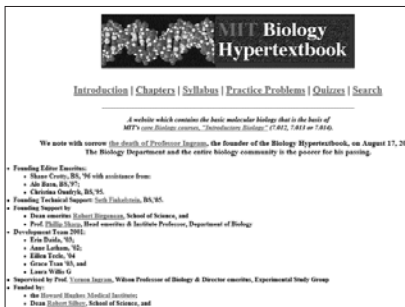


You're just lucky you're seeing this in Black and White

3.1.3 The MIT Biology Hypertextbook

<http://web.mit.edu/esgbio/www/>

The Massachusetts Institute of Technology makes a lot of study material available online—there's some trivia for you. Among this impeccable material is the Biology Hypertextbook, which, according to them, is “A website which contains the basic molecular biology that is the basis of MIT's core Biology courses, ‘Introductory Biology’”.



The MIT Biology Hypertextbook is very advanced

The material is perhaps more advanced than you'll need, but it's an excellent resource if you want to learn beyond your syllabus. The Chemistry Review at the beginning is a quick recap of essential *fundas*, and an indicator of things to come—you'll be reading about Mendelian Genetics and Recombinant DNA, among other things.

As the site mentions, the Hypertextbook is more of a preparatory course for MIT's programmes, so this isn't comprehensive either—clearly you're expected to know your stuff before advancing on to MIT material.

3.1.4 The Complete Introduction To General Biology

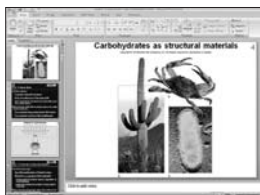
www.waybuilder.net/free-ed/Science/Biology/GenBio/GenBio02_TBK.asp

This page gives you free study material—assignments, PowerPoint presentations, etc.—to use alongside your copy of *Biology* by Sylvia S Mader. Even if you don't own that particular book, this site is an excellent resource to gain a little extra knowledge and test what

you already have. The site is meant for high school level students.

The Animation Quizzes are perhaps the most entertaining part of this site. You're shown a brief, informative cartoon of sorts about the topic in question, and you then need to answer a few quiz questions following it. It's fun even if you're not studying Biology!

For each lesson, you can download a PowerPoint presentation that summarizes the topic quite well. The images used are incredible, and overall, the presentations are well-structured and vibrant.



The Lecture PowerPoint presentations are excellent



This textbook supplement does its job well



Take a quick quiz based on an animation

3.2 General Interest And Interactive

The sites that follow aren't bookish at all—instead, they focus on learning about different aspects of Biology through interactivity and, well, non-bookish methods. Don't expect them to come to aid when you need to cram for a paper—they're more about the “joys of learning.”

3.2.1 The Tree Of Life Web Project

<http://tolweb.org/tree/phylogeny.html>

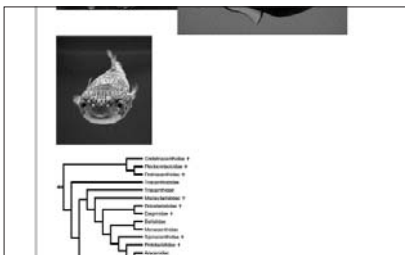
The Tree of Life (ToL) represents the collective efforts of a hundred-odd biologists from around the world, and has evolved into something of a bio-wiki. Before starting out on your journey, read the ToL learning guide at <http://tolweb.org/tree/learn/learning.html>. It gives you a look at how the site is organised, and how you need to go about getting the information you desire. You'll also find help under the Help menu at the top of the page.

Navigating the site is very wiki-like—you can view the most popular pages, the most recent, or just any old random page. Each article page is loaded with some remarkable imagery, a classification chart, lots of information, and tonnes of references. Throughout the pages, you'll find highlighted words that display a brief definition when you hover the mouse cursor over them. At the top left of the article, you'll see a faint button—click on it to bring up controls that will let you navigate up to the parent group of the article's subject, a subgroup, if any, or sideways within the same group.

One more interesting thing about the ToL is the Treehouse. It's a collection of pages that centres around a particular theme, created by the users themselves. There are very detailed instructions on how to make a Treehouse in the Learning Guide itself—round up a few friends and give it a go!



The Tree of Life is nurtured by hoards of biologists from different countries



The Tree of Life's articles are very well presented

tionary. The forums are alive with discussions on topics ranging from zoology to bioinformatics, and are a great place to start if you're looking for answers to questions you might have. Of course, you'll need to register before you start discussing.

The Articles section is a collation of a ridiculous number of biology-related articles, further subcategorised according to subject. The articles come from sources like Yale and Carnegie Mellon University, so you don't have to worry about quality of content. The sheer number of articles you can read will keep you busy for days, if not more.

The tutorials section is well-structured, though no tutorial has been updated since 2005. Each tutorial is like a chapter in a text book, and touches upon (at the very least) everything related to what you're reading about. The tutorials section isn't as copious as the Articles, however, and you'll find yourself going through it rather fast.

For best results, have a window/tab of the Biology Dictionary open while you're reading the tutorials. The dictionary is actually a wiki, so you can even add to it if you find missing terms. Make sure your contribution is authentic, though.

The screenshot displays the Biology Online website interface. At the top, a navigation bar includes links for Home, Lessons, History, Tests, and a search bar. The main banner features the 'Biology Online - Information on the Life Sciences' logo and a row of icons representing various biological fields. Below the banner, there's a 'Biology Online' sidebar with a description and a 'Recent Features' section. The main content area includes a 'New!' announcement, a 'Type' dropdown menu, a table of 'Lessons' with columns for Topic, Available, and Views, and a 'History of Biology' section.

Topic	Available	Views
1. The cell	Yes	12
2. The cell membrane	Yes	12
3. The cell wall	Yes	12
4. The cell nucleus	Yes	12
5. The cell cytoplasm	Yes	12
6. The cell organelles	Yes	12
7. The cell division	Yes	12
8. The cell death	Yes	12
9. The cell growth	Yes	12
10. The cell differentiation	Yes	12

Biology Online's forums are teeming with questions

[illegible]

Read through the modest collection of tutorials at [Biology Online](http://BiologyOnline.com)

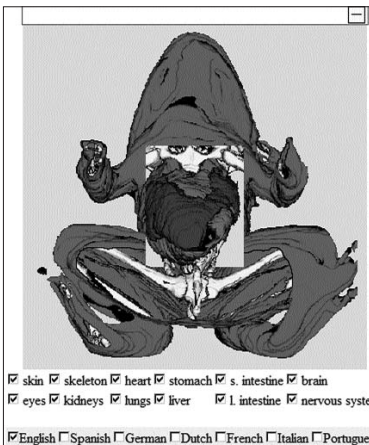
3.2.4 The Virtual Frog Dissection Kit

<http://froggy.lbl.gov/virtual/>

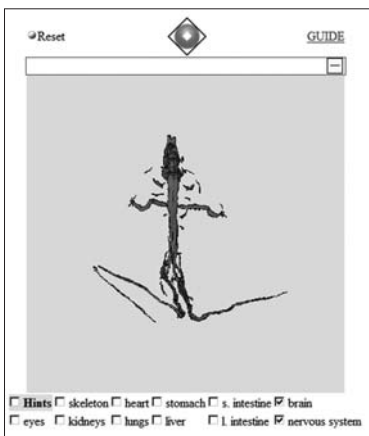
The Virtual Frog Dissection kit is a part of the Whole Frog project, which enables high school students to learn the nitty-gritty of frog anatomy through the wonders of 3D MRI rather than actually cutting them up. The kit is the result of the efforts taken by the team.

It isn't the most user-friendly of Web-based programs, we found. If you're working on a high resolution, the frog is going to look tiny, so we recommend hitting the "+" button in the top-right corner. Once you've done that, studying the frog's individual systems is as simple as turning layers on and off using the checkboxes at the bottom. Use the diamond on top to flip or rotate the frog as you please.

While informative, the application does tend to get frustrating—every single thing you do causes the page to reload, so if you're not on a reasonably fast connection, you're not going to like the experience much—a more responsive update would be more than welcome at this stage.



Fluffy the frog, all ready for his dissection



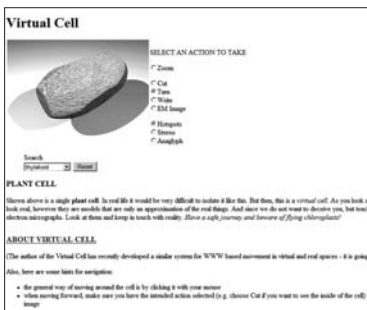
Can you build a frog from scratch?

The inverse of the dissection kit is the Virtual Frog Builder game, which shows you the frog's nervous system, and has you build the rest around it. Click a check box to activate a part, and click inside the diagram to place it. You get points for every correct attempt, and lose them for every wrong one. The underlying software is the same as that for the dissection, so getting familiar with the dissection first is advisable. As the site says, "building a frog can be harder than it looks."

3.2.5 The Virtual Cell

www.life.uiuc.edu/plantbio/cell/

The Virtual Cell lets you get inside a plant cell using just your mouse. The page is simple, and doesn't seem to have been updated in a while. Navigating the cell itself can be a little tricky, but somewhat starts to make sense after a while. Here's what you have to do:



1. First, select an action—Cut gets you in the cell, Turn rotates it, Stereo generates a stereo image, and so on.
2. Select a specific view from the Search drop down—you can zoom into any of the parts of the cell, like the chloroplasts. If you don't want to view anything specific, just set it to "nothing".
3. Click on the image of the cell to zoom in.

Get into the cell with the Virtual Cell

When you zoom into specific views, you get a little dose of information about what you're viewing, though you'll need to turn elsewhere for more advanced information. The site is also badly in need of a modern makeover—for now, you'll have to content yourself with what's already there.

3.2.6 The Anatomy Of Memory

www.exploratorium.edu/memory/braindissection/index.html

This micro-site is part of the much bigger Exploratorium (www.exploratorium.edu). Apparently, the brain of the sheep is quite similar to our own, so studying its structure offers insights into ours—specifically, the areas that deal with memory, which is what this dissection is about. It isn't as gross as it sounds, so it shouldn't be too much of a bother to those with weak stomachs.



The sheep's brain is much like ours, it seems

You can walk through the dissection on the site itself, or download the videos (use the little RealPlayer icon on the left). Navigation is a little weird—the Next and Previous buttons aren't at the bottom like they should be, and we still haven't figured out *what* the buttons' images are supposed to be. That aside, each step is shown in vivid detail, and should you happen to land a sheep's brain of your own, you won't have trouble taking it apart yourself.

3.2.7 The Franklin Institute Resource For Science Learners

www.fi.edu/tfi/units/life/

This is more of a general interest site than anything else—it's about Life and Living Things. Instead of the usual boring categories, you can browse information under "Individuals", "Families", "Neighbourhoods" and "The Circle of Life"; the titles are intriguing enough to get you started, but are a tad misleading when you look at the information under them. Still, none of the content seems like it's been forced into a category. Click on "For Learners" for a dose on a few interesting topics—not all may be related to biology, mind you, and we wouldn't be surprised if

the page was updated by the time this reaches you. Just to demystify the classifications—the Individuals section deals with the building blocks of life itself—cells, tissues, and so on. The Families section is all about how plants and animals are classified; the Neighbourhoods in question are ecosystems and how living beings interact with them. Finally, the Circle of Life is all about...well...the circle of life, life cycles and so on.

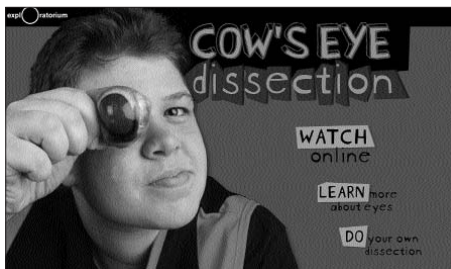


Learn about Biology and other sciences at the Franklin Institute

3.2.8 Cow's Eye Dissection

http://www.exploratorium.edu/learning_studio/cow_eye/

This is another micro-site within the Exploratorium which teaches you all you need to know about the eye—in almost painful detail. You can learn about the eye from its friendly text pages, or watch videos



Definitely not for the weak of stomach

of the dissection of a cow's eye—you'll need RealPlayer for this. You can also download a step-by-step guide to doing your own cow's eye dissection! While the pictures of a pre-teen playing with cows' eyes may be a little disconcerting for some, it's worth the effort to hold your lunch down—after all, biology isn't always neat and clean now, is it?

History



If you're a mugger-upper, skip this chapter! What we're presenting here will augment what you learn in class—if you're interested in going beyond class, that is. A real grasp on history cannot be had from one textbook or even three—hence this chapter, for those keen on knowledge.

History is a touchy subject. No two historians will agree upon any given event or person—whether it's about “Was Akbar a great ruler” or “Was it World War II that resulted in India's independence.” What you see in your history textbook would typically be a politically correct assimilation of the work of various historians.

We believe different perspectives are in order: whether it's just to impress your teacher about how much you know, or whether it's to forge a real understanding of world and Indian events, it's always a good thing to read up from diverse sources. What follows is a listing and review of some sites for world and Indian history.

Along similar lines, when it comes to history, don't believe everything you read on the Internet—and, for that matter, don't believe everything your textbook says! You'll need to assimilate the information you get and develop your own ideas—the more the sources, the better.

4.1 Classic Encyclopedia

www.1911encyclopedia.org

From the site, “This LoveToKnow Classic Encyclopedia project works to bring to you the renowned 1911 Edition of the Encyclopaedia Britannica.” It's not a site only about history—it's about a lot of things, ranging from places and languages to health. But there is a history section as well.



A lot of things, with a good amount of history thrown in

The history section is devoted to a lot of world history. It's organised in hierarchical fashion where possible, for example, Europe > British Islands > England > South West England.

You might not want to navigate to “Members of the US House of Representatives,” but you’ll certainly want to take a look at Ancient Greece, Ancient Rome, The Middle Ages, the history of Britain, France, and Germany, and, of course, the history of India.

Let’s take an example: Ancient Greece. There are 142 articles in the category, including those on such well-heard words as “Acropolis,” “Olympia,” and “Rhodes.”

We took a look at the history of Rhodes, and found that the article is very well-hyperlinked. Here’s a short excerpt:

“Among such settlements may be mentioned Phaselis in *Lycia*, perhaps also Soli in *Cilicia*, Salapia on the east *Italian* coast, *Gela* in *Sicily*, the *Lipari islands*, and Rhoda in north-east *Spain*. In home waters the Rhodians exercised political control over Carpathos and other islands.”

You may not be enamoured by the history of Rhodes, but note here that all the italicised words are linked to articles—essentially everything that might need further explanation. It’s a gold-mine of information.

There is no chronological presentation; under History of Germany, for example, we’d have liked a timeline and a sequence of events. What we get instead is links to a whole lot of articles, and one needs to piece the story together.

It’s the same with the History of India: names and terms all over the page—coverage is comprehensive, like we said—but no continuity. Aurangzeb. Bahadur Shah I. Peshwa. Lord Bentinck.

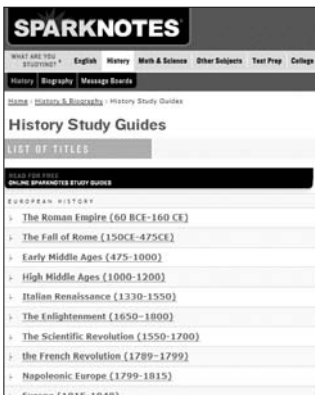
This site is best used as a reference—indeed, it makes no pretence at being anything else; it is, after all, an encyclopaedia. So if you’re reading up on history and come across “thugs”—come here and look up the term. (Yes, it’s there. And “thuggy” is a word, too.)

4.2 Sparknotes

www.sparknotes.com/history/

Sparknotes' history study guides are pretty good, in our opinion. There's a wide range of periods and regions to choose from at this page, and there are quite a few that might be of interest to you. Unfortunately, there's no Indian History section.

Note that you can buy a PDF (and then print it out) for any of the headings for just about \$5. We don't know what's in the PDFs that's not in the notes on the site—no word on that; it just says the PDFs are “full versions.” So what are these? Buy a PDF and tell us!



For the eager student

In any case, choose to read up on the Roman empire, the Renaissance, the French Revolution, the Russian Revolution, the World Wars, and a lot of American history. Of course, there are more, but we're sure you don't want to read about The Interwar Years (1919–1938) in the United States.

In each section—say the French Revolution—there's a set of blue-coloured links: an Overview, a Summary of Events, and Key People and Terms. These are followed by grey-coloured links, which talk about dates and events in detail.

These are followed by study questions, a quiz, and a bibliography. There happens to be an easy navigation bar for quick access to sections.

Organisation is pretty neat: it goes date-wise (the grey links). If you're a casual reader, the blue links (the Overview etc.) should

suffice. We must say that the quality of the writing, while not exceptional, is student-friendly. Here's the first paragraph of the Overview of the French Revolution:

"Historians agree unanimously that the French Revolution was a watershed event that changed Europe irrevocably, following in the footsteps of the American Revolution, which had occurred just a decade earlier. The causes of the French Revolution, though, are difficult to pin down: based on the historical evidence that exists, a fairly compelling argument could be made regarding any number of factors."

(OK, we did say that historians don't agree upon anything, but this seems to be an exception.)

We'd recommend the site not just to students but also to adults interested in getting a grip of some world history in a short while. Just read all the Overviews!

4.3 The Encyclopedia of World History

Ancient, Medieval, and Modern

www.bartleby.com/67/

Here, you'll find articles ranging from "Homo Erectus" all the way to "Global Warming." The really cool thing about the site is that it's well chronologically ordered, so if you go to "The French Revolution and Europe, 1789-1914," you can then go to

The screenshot shows the Bartleby.com website interface. At the top, there's a navigation bar with links for Reference, Verse, Fiction, and Nonfiction. Below this is a search bar with the text "Search World History Encyclopedia". The main content area is titled "The Encyclopedia of World History" and "Ancient, Medieval, and Modern". It mentions the "Sixth Edition" and describes it as a volume that has always intended to convey the key features of world history. There's a quote from the Preface to the Sixth Edition. Below this is a search box with a "Go" button. At the bottom, there's a "CONTENTS" section with links for Preface, Contributing Editors, Maps, Genealogical Tables, and Bibliographic Record. The address at the bottom is "BOSTON: HOUGHTON MIFFLIN COMPANY, 2001" and "NEW YORK: BARTLEBY.COM, 2002".

All in order!

- Overview
- The French Revolution, 1789–1799
- The Napoleonic Period, 1799–1815
- Western and Central Europe, 1815–1848

And so on. Each heading—that is, article—is just about the right length, giving you no more nor less information than is essential. At least in our opinion; your mileage may vary.

Let's look at one article in detail—let's use the French Revolution again as an example:

“Causes of the Revolution.

“(1) Intellectual currents of the Enlightenment proposed governments based on contracts or constitutions rather than divine authority. Such ideas were discussed in the salons organized by women in Paris and by the philosophes (reform-minded intellectuals) surrounding Diderot's encyclopaedia. (2) Economic developments expanded a middle class that, although often involved in the royal bureaucracy, had little access to formal politics. This middle class was concerned with obstructions to economic development and commerce, such as the guild system, internal tariffs, and the lack of common weights and measures and adequate roles for professionals...”

It is, as you can see, not for the average, casual reader. It assumes someone with some knowledge of historical terms and even with some knowledge of history. Somewhat not recommended, if you're in the tenth standard, and somewhat recommended as a reference if you're doing a B.A.

Why we're recommending the site is mostly because of the excellent chronological ordering of events, and the range of subjects under one umbrella. Unfortunately, the section on Indian history is hardly comprehensive; British Indian history is summed up on one (long) page.

4.4 The History Guide

www.historyguide.org

From the page, The History Guide contains the complete content of three undergraduate courses in European history which will certainly be of use to

The History Guide
revolutionizing education in the spirit of Socratic wisdom

I am here only at revealing myself, who will perhaps be different tomorrow, if I learn something new which changes me. I have no authority to be believed, nor do I want it, feeling myself too ill-instructed to instruct others. (Montaigne)

Contents

- A Student's Guide to the Study of History
- What is History?
- Resources for Historians
- Lectures on Ancient and Medieval European History
- Lectures on Early Modern European History (in progress)

The History Guide has been created for the high school and undergraduate student who is either taking classes in history, or who intends to major in history in college. The purpose of The History Guide is to better prepare yourself for your history classes and to make your time in class more enjoyable and proficient.

The History Guide contains the complete content of three undergraduate courses in European history which will certainly be of use to those of you studying such topics at the college level or in A.P. European history classes. The History Guide contains ninety lectures in European history from ancient Sumer to the fall of Soviet-style communism in 1989. In essence, what is presented here is an online textbook in western civilization, with special reference to the western intellectual tradition.

Parents engaged in home schooling their children will find much that is of interest and I urge you to contact me if there are any details I can help provide to you.

More literary than most

those studying such topics at the college level. The History Guide contains 90 lectures in European history from ancient Sumer to the fall of Soviet-style communism in 1989. In essence, what is presented here is an online textbook in western civilisation.

The contents pane on the left lists out the topics covered, which include A Student's Guide to the Study of History, What is History?, Ancient and Medieval European History, Early Modern European History, 20th Century Europe, and more. Of course, it's all Europe, but then you do have things of interest here—the French Revolution, the Russian Revolution, the Scientific Revolution, and so on.

To use (or overuse) our favourite example—the French Revolution—here's an excerpt from the overview:

"The outbreak of the French Revolution in the summer of 1789 stirred the imagination of nearly all Europeans. The French revolutionaries—that is, those men and women who made conscious choices—sensed in their hearts and minds that they were witnessing the birth of a new age. And if the revolutionaries of Paris, Bordeaux, Lyons or Toulouse knew they were innovating, knew they were helping to usher in the dawn of a New Jerusalem, so too did observers in London, Berlin, Philadelphia, Moscow, Manchester, Geneva, Amsterdam or Boston."

As you can see, this is more of a literary work than the average textbook, and some will find it more readable for that reason. Those who just need a quick run-down of the facts, stay away! The writer digresses often, and there are quotes aplenty. Still, for those who like a good read *and* want to come up to speed on some history, this site should provide hours of infotainment.

As a final word, we should mention that the pages here are moderately hyperlinked, but to external sources, so not all of them may work.

4.5 Spartacus Educational

www.spartacus.schoolnet.co.uk

Links, links, and more links! That's what you'll find here—and the links cover diverse topics. This is a site you'll just have to browse to get a feel of, but don't worry—it's not one of those all-links-no-material sites. In fact, there's almost too much material.

There's actually a site map, and a search box. Now, immediately after "Encyclopedia of Football" comes "The crimes of George H W Bush."

OK. Before you think this is a totally spaced-out site, let's take a look at the link called "Second World War."

Here's a sampling of the links under that heading:

- *The Armed Forces*
- *Russian Military Leaders*
- *War Journalists*
- *Nazi Germany*



As scrambled as it gets!

- *The Holocaust*
- *Weapons and Tactics*

The site is unconventional in presentation. Under the link “background to the war,” you get a few dates and events, with no text. However, most words there are hyperlinked—such as “Adolf Hitler,” “Reichstag,” and so on. As you might expect, these links lead to pages chock-full of information. (And if you didn’t guess it, a lot of that information is hyperlinked, too.)

Similarly, under “British Military Leaders,” you have no text, just a whole bunch of hyperlinks—but those linked pages contain a wealth of information.

Broad topics covered include the Wars, British History, Nazi Germany, the American Civil War, the Russian Revolution, and so on—and amongst the not-so-usual suspects, you have “Ask a History Question” (!) which requires registration, the Kennedy Assassination Forum (now what could that be?), the history of aviation... you get the idea. A total mish-mash, but if you can live with it, you do get the information, which happens to be pretty well-written.

The subject matter here is vast, and you’ll have to piece together the story yourself. This is a site more suitable for detailed study than for casual reading or brushing up. For the student, it would be advisable to use each of the individual pages for background information on what is learnt in class.

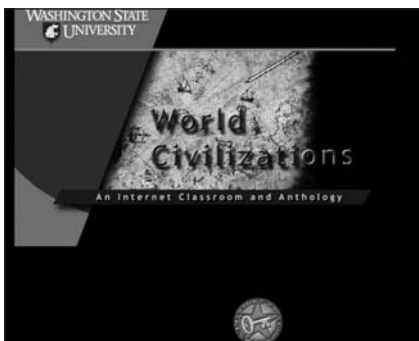
4.6 World Civilizations

.....
www.wsu.edu/~dee/

Don’t be put off by the design of the site—it looks like someone has been playing around with some HTML and the Caps Lock key here. Anyway, when you click “Browse,” you get some headings that don’t seem to make too much sense. But persist and you’ll find that it’s an online course, with glossaries and such thrown in with online text. To be perfectly honest, it’s horribly organised.

The online texts are large. For example, we clicked “Culture, Conflict, and Modern World Civilizations after 1500,” and got to a page that listed out several class units. There are references (which might or might not be useful—you find out) and sections on the texts available at the site.

So here, click on Unit 2 > *Brave New Worlds: What is Reformation?* > Text File: *Discovery and Reformation*, and you’ll get a large text that begins thus:



A short course on non-Web design

“It’s hard to know why Europeans suddenly expanded over the globe with such rapidity and such ferocity. At the beginning of the fifteenth century, the world was a fairly small and contained place for Europeans. While they knew about far-flung areas such as China and southern Africa, their world view was still narrowly focused on Europe and the Mediterranean.”

“Within two hundred years, Europeans would be all over the world with settlements on every continent except Australia and Antarctica. By 1600, most of the coastline of the Americas would be under the domination of Europeans as well as all the major cities in eastern Africa. How did this happen? How did Europeans suddenly end up all over the world? And how did this change the European world view?”

Interesting. Similarly, you’ll find stuff on Martin Luther, The Enlightenment, The Industrial Revolution, Capitalism, and so on. To give you an idea of the haphazard navigation system again, there’s one text called “Capitalism” and one called “Capitalism Reader.” And the first one is actually about the Industrial Revolution, and it happens to be titled “Capitolism.” Huh?

With all these shortcomings, why are we recommending Richard Hooker's site (he happens to be, apart from the Author and Principal Editor, responsible for "Graphic Design" and "Technical Design")? Well, the site "is the culmination of over two years of web-based teaching and learning. The site combines the reading and course materials of two World Cultures courses taught using web-based materials since Fall of 1994. The site is now expanding into a larger resource for a larger population and distribution of students and will eventually consist of a rich anthology of readings, a complete set of textbook materials, a set of interrelated learning modules, and a finished glossary."

We don't really care what it will be some time from now, but what it is now is a collection of some very useful resources. Like the large document on colonial expansion we mentioned above. And if you're looking for something—say the French Revolution—you will find it if you browse hard enough, ignoring some broken links.

The texts are good, period. Here's another sampler, this one from the beginning text on the French Revolution, of which you are, by now, doubtless sick:

"History has not been kind to Louis XVI; in fact, history is rarely kind to the losers. He is painted as vain, unintelligent, and ineffectual, so clueless that on the day the Bastille was seized by revolutionaries, he wrote in his diary, 'Rien,' 'Nothing happened.'"

"It's difficult, however, to really assign any blame. The Revolution itself was an extraordinarily complicated affair; it was principally lit by the antagonisms between the first two and the Third Estate, antagonisms rooted in decades of abuse and frustration. It is certain that Louis XVI failed to maintain the centralization of power; all the forces in France were conspiring to fragment power away from the monarchy."

(A few pictures stand side by side with the broken links to provide visual relief.)

About Indian History On The Web

We said history is a touchy subject. Let's qualify that a bit further: *Indian* history is a *very* touchy subject. The education ministries in some states are going out of their way to rewrite it. There is heavy controversy about whether the Aryan Invasion happened. And, let's face it, we Indians, if not exactly racist, are communalists of the worst order. You'll find historical sites glorifying each of our major religions and their followers and what they did, each of our geographical regions and their contributors to our country's greatness, and what not.

In such a state, how is a student to study history? We can say nothing more than what we said before: use your own judgment.

We at *Digit* do not stand in support of any community, religion, or whatever; the sites we mention below, while informative for the most part, contain a bias one way or the other. Although it's understood, we reiterate: we are not responsible for the content of the following sites! We make an exception to our rule of recommending sites, and expressly state that we are not recommending *any* of the following. We are merely pointing you to them.

4.7 Kamat's Potpourri

www.kamat.com/kalranga/itihasa/history.htm

This is a page we present as a brief overview of Indian history through the ages. The topics covered start off from the Indus and Saraswati Civilisations through the Vedic Period to the "Moghul" Empire (sic) and British India. It does call itself a potpourri, so don't expect anything more or anything less. There's a special section on the Timeline of Karnataka, by which we gather that the author is from that state.

You'd do well to explore all the links and choose what you want to settle down upon and read. Some of the information is sketchy, and some is detailed—which only reflects the author's bias.

The Timeline (as in the screenshot) is good; also note, in the first column, "More Timelines."

Periods	Pre-History	Indus & Saraswati Civilizations	Vedic Period	Rise of Jainism and Buddhism	Mauryan Period	Golden Age of Indian Arts & Sciences
Events in the Land of the Timeless Theater	 <p>Indian History is as old as the History of Mankind. Artifacts dating back to as much as 500,000 years have been found</p> <p>Sources: How we know what we know</p> <p>Pre-History</p> <p>Rock Paintings</p> <p>Cave Life & Cave Art</p>	<p>Harappa and Mohenjo-daro Communities (2500 - 1550 B.C.)</p>  <p>Dravidian traditions are established in south</p> <p>2000 B.C.</p> <p>Hero-stones</p>	<p>Aryan Migration</p> <p>Vedas are composed</p> <p><u>Mahabharat is composed</u></p>  <p>Hinduism takes deep roots</p> <p>Caste System is established</p> <p>1000 B.C.</p>	<p><u>Gautama Buddha</u> (563 - 483 B.C.)</p>  <p>Mahaveera (599 B.C.)</p> <p>Bimbisara of Magadha (542-490 B.C.)</p> <p><u>Jainism</u></p> <p><u>Buddhism</u></p> <p>600 B.C.</p>	<p>The Great Alexander invades parts of India (326 B.C.)</p> <p>Chandra Gupta Maurya (300 B.C.) and establishment of the Indian Empire</p> <p><u>Emperor Ashoka</u> (272 B.C.) and spread of Buddhism</p> <p><u>Mauryan Empire</u></p> <p>400 B.C.</p> <p><u>Ancient India, the land of mystery</u></p>	 <p><u>Maharaja</u></p> <p>Temples are built</p> <p><u>The Hoysala Dynasty</u></p> <p>The temples of <u>Rejur, Halebid</u> are built.</p> <p>Chalukyas of <u>Badami</u> and <u>Kaivan</u></p> <p><u>Guptas</u> (320-647)</p> <p><u>Pallavas</u> of <u>Kanchi</u> (300-688)</p> <p><u>Fa-Hien</u> (400) & <u>Monks, Chinese</u></p>

Decent design, colourful, informative

The visual elements at this site are rich, and enticing enough to make you want to read. A typical excerpt follows.

"In his efforts to propagate Buddhism, Ashoka built shrines and monasteries and inscribed Buddhist teachings on rocks and pillars in many places. He sent missionaries to countries as remote as Greece and Egypt; his own son, a monk, carried Buddhism to Sri Lanka, where it is still the major religion. Despite Ashoka's vigorous exertions of faith, he was tolerant of other religions. The empire enjoyed remarkable prosperity during his reign.

"Some Indian historians think that his policy of peace led to the downfall of the Mauryan empire, which fell apart after his death. He was soon largely forgotten by Indian tradition and only remembered in Buddhist circles as a great patron of the faith. With the deciphering of his inscriptions during the 19th century, he took his rightful place in world history as one of the most benevolent rulers of antiquity."

Now why did we choose this site? It's simple: it's as culture-neutral as we could find. The site has all its sources listed out, again in the first column. But then, which history site doesn't, and how hard are sources to find?

We also liked this site for the extra-curricular sections, for example, “Medieval Men’s Fashionable Hats.” For the more curious amongst us, of course. And also for bringing to our notice some little-known rulers, regions, and so on... explore!

4.8 Indian History

www.indhistory.com

This is probably the closest to what you might call a super-site on Indian history, though there really is none worth that name. There are three links for convenient navigation, right at the top: Ancient India, Medieval India, and Modern India. There’s also a navigation pane on the left for some sub-topics.

From “Mediaeval India”: the navigation pane is gone, you get a very brief sketch of mediaeval Indian history, and then the nice part—a timeline with working links. Some of the links lead to long pages, some to short stubs, but they’re all informative—and most of them illustrated as well. Here’s a look at a section of the timeline:

1605—*Jahangir*

1609—*The Dutch open a factory at Pulicat*

1615—*Submission of Mewar to the Mughals*

1620—*Capture of Kangra Fort*

1623—*Shah Jahan revolts against Jahangir*

1628—*Shah Jahan proclaimed*

Emperor

1636—*Aurangzeb appointed*

Viceroy of Deccan

1646—*Shivaji captures Torna*

Yes, there are even entries for things like “The Dutch open a factory at Pulicat.” Let’s take a look at part of one entry:



Reasonably Detailed

“Jahangir, after being enthroned the king, was seized with the desire to conquer Kangra and capture the fort, about which it was believed: ‘He who held the fort, ruled all the hill states’.

“The fort, a winsome blend of the medieval and ancient genre of fort architecture, covers a fairly large area and is guarded by high ramparts and a huge wall. Its gates have been named after its conquerors who captured it from time to time.”

It's such snippets along the timeline that make the site worth the while. For example, here, Jahangir was mentioned earlier along the timeline. It's as close as you can get (on the Web) to a year-by-year timeline of Indian history.

Unfortunately, there are no sources quoted at all, as far as we can see. But then, not all Indian textbooks quote their sources, either.

4.9 South Asian History

http://india_resource.tripod.com/sahistory.html

Here's an excerpt from the “About this site” link:

“Our selections illuminate aspects of South Asian History that aren't always very well known, but of crucial importance to the region's future.

“Although most of our selections focus primarily on the Indian experience, there are many aspects of Indian history that also reflect the history of its South Asian neighbours. In the ancient world, social and political borders were neither fixed nor did they always tally with present national divisions. For instance, during much of India's Buddhist period (and also during the Gupta period), Afghanistan was politically and culturally affiliated with Northern India...

“Trade and cultural links between India and its neighbours like Bhutan, Myanmar and Sri Lanka were usually quite extensive, even extending to Thailand, Indonesia, Cambodia and Vietnam in the East, and Persia,

Central Asia, the Arab world and coastal E. Africa in the West."

This is, as we gather, mostly a site on Indian history—keeping the country's neighbours in mind for perspective.

Here's a sampling of subjects covered:

- *The "Aryan Invasion"*
- *History of Mathematics in India*
- *Islamization and the Arab conquest of Sindh*
- *Rise and fall of the Mughals*
- *The Sufis*
- *British Education in India*
- *"Moderates" versus "Extremists" in the battle for "Swaraj"*

The site *does* rake up some controversial issues, which we won't mention. But this adds to the flavour and makes for a more interesting read—the other side of the coin.

It should provoke young minds and fuel the pursuit for more—after all, what's history without a little controversy?

"But even as there are many who have been inspired by Gandhi's life and contributions, there are also those who are sharply at odds with his message. None of us should have any illusions that Gandhian charity alone is enough to transform our nation, or enough to realize it's maximum potential. Every nation must always look to the future—no nation can afford the luxury of lionizing past leaders with it's eyes closed to what may have been serious shortcomings, or even fatal flaws."

There you have it. Go ahead, pick a side!



All text and no pictures: hard-core stuff

4.10 Boloji.com: History

www.boloji.com/history/index.htm

This is a collection of articles that seems eclectic, but which, in fact, cover a large portion of Indian history. They aren't all written by one person, and that means diversity in style as well as in bias. (Yes, like we said, you have to get used to bias in Indian history.) Here are excerpts from some of the essays:

○ A Nation without a History

"The attempts to decipher the true history of India have been too few and too often undertaken under unfavourable conditions. The ancient Indians themselves often freely conflated their ideas about India's past events with their beliefs. The end result was an often confusing mix of fantastical mythology with plenty of internal contradictions, unbelievable timeframes and an endless supply of names of kings, priests, seers, noblemen and commoners. Taken as a whole, the testimony would seem tainted and probably worthless."

○ Language and Architecture of Ancient India

"The Vedic language (later called as Sanskrit) was akin to languages of the European continent spoken by tribesmen around 2000 B.C.E. The earliest surviving Sanskrit literature is the Rig Veda. As time went on many of the words of the original language were forgotten and became obsolete."

○ The Indomitable Marathas


"Shahji Bhonsle had a son, Shivaji by name, who rebelled against the Bijapur's authority. A mere seventeen-year-old Shivaji carved himself some land around Pune by using trickery and ingenuity in 1647. This land had belonged to the Bijapur Sultans and was adjacent to the Deccan border of the Mughal Empire."

As you can see, the essays are written in a rather matter-of-fact way—not really literary. The site seems to have been designed as a platform for budding historians to showcase their work. Also, there's no timeline so you'll have to piece together the story for yourself. We wouldn't recommend this site if you don't already have a grounding in the basics. This is just additional, but useful,

information. But we should mention that the collection of history articles does include several informative ones on British and Mughal India.

The “Our Heritage” link at the left is interesting. You’ll find links to Architecture, Buddhism, Culture, People, Places, and so on. These are loosely related to history:

for example, the articles on Buddhism focus more on the religious aspect, but do cover some of the historical.

<p>News</p> <ul style="list-style-type: none"> Channels Focus Analysis Bibliography Cartoons Environment Opinion Columns My Word Plain Speak Random Thoughts Our Heritage Architecture Astronomy Ayurveda Buddhism Cinema Culture Dances Festivals Hinduism History Baselle 	<p>History of India</p> <h3>A Nation Without a History</h3> <p>It is a common refrain that India lacks any history. Although the antiquity of the civilization is well-known, there are no pyramids nor ancient stone temples to speak of nor any stone walls with inscribed hieroglyphics. Who then were these people? Were they a nameless, faceless mass of population or were they living, breathing, caring individuals with distinct personalities and aspirations? Did they have names and did they name the cities they lived in? Is there any way to know if they left us nothing?</p> <p>The attempts to decipher the true history of India have been too few and too often undertaken under unfavorable conditions. The ancient Indians themselves often freely conflated their ideas about India's past events with their beliefs. The end result was an often confusing mix of fantastical mythology with plenty of internal</p> 
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Articles without a connection—but they’re good

Geography And Civics



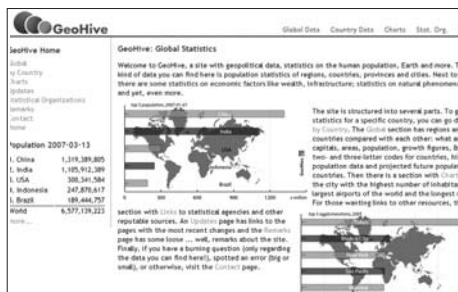
As in history, geography, too, should ideally be learnt such that one gains a perspective on things instead of just learning facts. This chapter encourages you to develop one. In addition, we present a few sites that can help you with your civics.

5.1 Geography

GeoHive

www.geohive.com

We'll let the page spell out what it's about: "GeoHive is a site with geopolitical data, statistics on the human population, Earth and more. The main kind of data you can find here is population statistics of regions, countries, provinces and cities. Next to that there are some statistics on economic factors like wealth, infrastructure; statistics on natural phenomena; and even more."



Population figures galore!

You might be a little befuddled when you see all the links pointing to "xist.org": the idea is, geohive.com and xist.org are the same site. Click "Home" at the top right and you'll get to www.xist.org—which will be the same page you were looking at.

At first glance, the site creators may seem obsessed with population figures, but worry not: there's a lot of ready access to information at this site.

The links you'll be clicking are Global Data, Country Data, and Charts, which are respectively Global, by Country, and Charts on the left pane.

Under Global, you'll see almost too many links: "Overview of all countries," "Development status," "Human development index," "Surface area," "Population density," an obscene number of links under "Population," yearly population charts for every single country, and agriculture and economy figures. You'll be referring to this section primarily for figures, as you've gathered. What

was the population of Botswana in 1950? What countries are the largest, surface-area wise? How much rice was produced in Sierra Leone in 1995? We can bet our last rupee you won't need that last figure, of course, but what we're trying to say is that figures do say something, and that therefore, you can get a sort of bird's-eye view of the stuff the world is made of.

This section can also be seen as a wealth of trivia: you look at the projected population figures for 2050, and you see the following: India at the top with 1.5 billion, China next, the US third, and Pakistan fourth. And, for example, where are the wealthiest people? You have a link called "Gross National Income (total and per capita) for most countries for 2000 and 2003."

The second way of getting into this site is via the Country Data link. You have every country listed, in alphabetical order. You'll get the vital stats for each country—area, population, capital, regions, and such.

Now click "Mali" and you'll find "Tombouctou," and that its population is about a lakh. That's really Timbuktu in disguise. It just so happened we knew where the place was (in Mali), that's why we got to it. And that's the big, big problem with the site: there's no search box anywhere. At least we couldn't find one.

Under the Charts section, you'll find not too many—but those that are there are interesting. "Largest countries 1950–2050," "Age structure graph", and some more along those lines.

So this one is for

- Trivia: explore the site and find interesting figures.
- Extrapolations to 2050 in several cases, which can be interesting.
- Perspectives: India is 55 Australias in terms of people.
- Authority: Most figures are from *The World Factbook 2005-2006*, CIA. The CIA as in Central Intelligence Agency. So you can quote from this page.

Atlrapedia online

www.atlrapedia.com

Lots of stats again, but also full-colour physical and political maps. You'll see three big buttons—Countries A to Z, World Maps, and Class Resources. Don't believe that last one—it's just a few maps.



Click on one of these three, and at the bottom of the page, you'll find the search link. You can search this way, as the site says:

"Countries A-Z Search

Enter word(s). You can connect terms with "and" and "or"

Example: Russia or Ukraine and Yeltsin

Example: Afghanistan and literate and population

Example: Kenya and life and expectancy"

So what do these searches bring up? Actually, they all bring up country pages. So in the description of the Comoros, the terms "Kenya," "life," and "expectancy" do occur, hence Comoros figures in the search results. To reiterate, that's all you get—country pages.

These country pages can, of course, be accessed using the Countries A to Z link. So what's in a typical country page? Quite a bit.

For as relatively unknown a country as the Comoros, you get all the following: its location and geography, climate, ethnic groups, religions, languages, some history, what the economy runs on, what the armed forces are composed of, and more. (The Comoros army had around 500 soldiers, last count. They're peace-loving out there.)

So what's this site for? Well, simply for a decent "summary" of each and every country there is. Very useful. There are high-res maps as well, just in case.

And yes, we forgot: there's a glossary as well, for terms such as NATO and ASEAN, for when memory doesn't serve.

The World Factbook

<https://www.cia.gov/cia/publications/factbook/index.html>

This is the big daddy of all the country reference sites you'll find. Prominent on the page is a drop-down from where you select a country. You'll get practically all the information there is to be had for that country or region ("region" here refers to such things as "Indian Ocean," "Antarctica," and so forth).



The World Factbook: indispensable!

So here's a brief listing of what you'll get when you choose a country, say Antigua and Barbuda:

- A short background
- An extended list of geographical specifics, such as coastline
- A summary of the people, such as ethnicity and per capita income
- Extended details about the government
- An overview, followed by figures, of the economy
- Communications and Transportation information
- Details about the military
- and finally, "Transnational issues," which, in this case, includes the fact that Antigua and Barbuda was considered a minor trans-shipment point for narcotics bound for the US and Europe

This is just the list; when you actually look at one, you'll find the number of details is pretty large.

In addition to the countries and details about them, the following navigational aids are available:

- A maps section
- Notes and Definitions, to help you understand the country statistics better
- The Rank Order pages, where you get details already sorted—if you choose “HIV/AIDS deaths,” you'll get a list for that in descending order of numbers. There are many, many sorted pages, including Internet users, airports, and so on.

And you wouldn't believe it—you can download the entire Factbook for free! It's just a 40 MB download—well worth it for the amount of information you get.

There also happens to be a search feature, which you can use to find, for example, where Timbuktu is. Type in the name and you'll instantly find... nothing. You'll need to type in “Tombouctou.” And if you didn't know the official name, there's no way to find out it's in Mali. Actually, the search isn't very good—no results for “Canada per capita” and “Canada flag” either.

Country Studies

<http://lcweb2.loc.gov/frd/cs/cshome.html>

There aren't too many links on the main page; in fact, you'll use, apart from the search box, just two links—Country Studies and Country Profiles. The latter are condensed but more updated versions of the former, so let's stick to Country Studies.

Just choose a country from the drop-down, say Austria. You'll get a long chapter on history, a chapter on “The Society and its Environment,” then Economy, Government, and National Security.

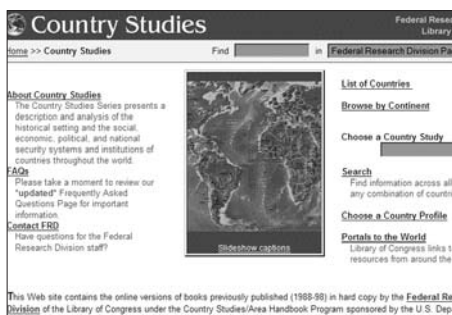
Of interest here is “The Society and its Environment.” Here, you get a main section called just Geography, which contains a summary of sorts. Then comes Landform Regions, Human Geography, Climate, and Ecological Concerns. Here’s an excerpt from the last, to give you an idea as to exactly how detailed the information is.

“The Alps serve as a watershed for Europe’s three major kinds of weather systems that influence Austrian weather. The Atlantic maritime climate from the north-west is characterized by low pressure fronts, mild air from the Gulf Stream, and precipitation. It has the greatest influence on

the northern slopes of the Alps, the Northern Alpine Foreland, and the Danube Valley. The continental climate is characterized by low-pressure fronts with precipitation in summer and high-pressure systems with cold and dry air in winter. It affects mainly eastern Austria. Mediterranean high-pressure systems from the south are characterized by few clouds and warm air, and they influence the weather of the southern slopes of the Alps and that of the south-eastern Alpine Foreland, making them the most temperate part of Austria.”

“Demography” might interest the geography student as well, and there are several sections under the main Demography section.

And that’s pretty much it—Country Studies, under which is to be found a lot of info in various categories. The geography student is likely to be interested in two or three sections per country, including the Geography section, of course.

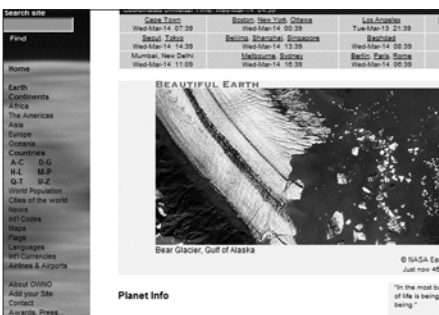


Information by country—all neat and nice

One World—Nations Online

www.nationsonline.org/oneworld/

Pretty site. There's a good photograph on the main page, which gave us an idea it would be a nice site. Actually, it's skimpy on info, and most of the useful content is from external sites.



In addition to the usual stuff, there's country-wise (latest) news at the right of the main page.

Navigating through to countries is simple enough, and so we navigated to Rwanda. Here's the opening paragraph, which pretty much explains things:

"A virtual guide to 'the land of a thousand hills'. Get an overview of Rwandan art, culture, people, environment, geography, history, economy and government.

"Beside a country profile with facts and figures, this page offers maps, statistics, weather information, and links to sources that provide you with information about this Central African nation: official Web sites of Rwanda, addresses of Rwandan and foreign embassies, domestic airlines, local news, city and country guides with travel and tourism information about accommodation, tourist attractions, events and more."

That doesn't exactly sound like course material, but it's all fun to read. For example, there's an entire site devoted to the genocide in Rwanda a few years ago, and the Rwanda page links to that site, too.

Different countries have varying amounts of information—for example, there are more links for India than for Rwanda. But common to all pages is the Summary.

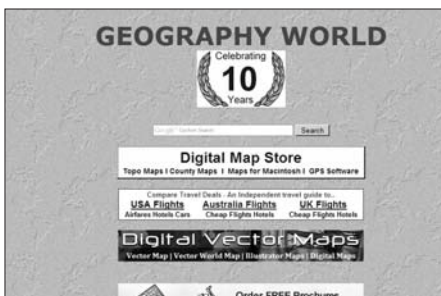
Apart from this, at the left, you have links to World Population, Cities of the world, News, Country Codes, Maps, Flags, Languages, and Airlines & Airports. Besides, you can search the site using the box at the top left.

We'd recommend this one if you're looking for a broader understanding of countries, beyond the facts and figures.

Geography World

<http://members.aol.com/bowermanb/101.html>

There's plenty of geography-related stuff at this page. And we mean plenty. Take a look at the categories: Africa, Earthquakes, Time / Calendars, Agriculture / Farming, Ecosystems / Biomes, Homework Help, Latin America, Ancient



Almost too much info!

Culture, Erosion / Weathering, Antarctica / the Arctic, Europe, Maps / Globes / Skills, Asia, Flags, Volcanoes, Australia / Oceania, Weather / Climate, Natural Resources / Energy, What Is Geography?, Conservation / Environment, Population, Earth's Land, Geography News / Info, World Culture, Earth's Water, World Geography, GIS / GPS, Tectonics / Continental Drift.

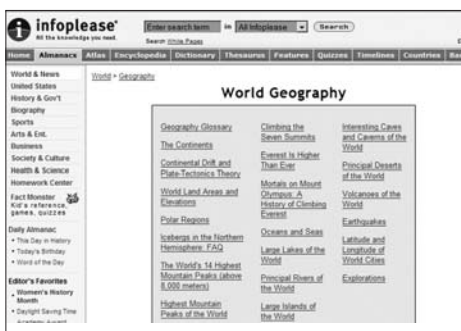
The idea is, you can expect tons of links at each of these categories! You wouldn't believe it, but just under "Tectonics / Continental Drift," there are 33 links. If you don't find everything you ever, ever wanted to know about plate tectonics from

these pages, we'll give you your money back for this issue!

Anyway, you've also got to note that most of these are external links, so some are, of course, broken.

Apart from this, there's also "Geography Games, Puzzles, Quizzes, Trivia." This has about 30 links. Some can be fun, some not so much, and some are too basic—you'll have to click and pick.

Navigating this site is so easy, it would be embarrassing for us to explain what else is on the page. Just one problem: some of the links are named wrong. Anyway, this is the best site we found on the Net for geography students—do take a look!



This site seems pretty random

World Geography

www.infoplease.com/ipa/A0873835.html

Apart from the main menu in the middle of the page, which contains seemingly random links, you also get "Everest Almanac," a World Atlas, a Distance Calculator, and other such miscellaneous links. Now in the main menu are the following:

- The Continents: Click on any continent for more information. This includes Geology and Geography, Climate, Peoples, Economy, and more.
- Continental Drift and Plate Tectonics Theory: The theory explained, with a map, and with external links where applicable.
- The world's 14 highest mountain peaks: Again a detailed list, and a couple of external links.

And the entire section list goes:

- The Continents
- World Land Areas and Elevations
- Polar Regions
- Icebergs in the Northern Hemisphere: FAQ
- Highest Mountain Peaks of the World
- Climbing the Seven Summits
- Mortals on Mount Olympus: A History of Climbing Everest
- Oceans and Seas
- Large Lakes of the World
- Principal Rivers of the World
- Large Islands of the World
- Highest Waterfalls of the World
- Interesting Caves and Caverns of the World
- Principal Deserts of the World
- Volcanoes of the World
- Earthquakes
- Latitude and Longitude of World Cities
- Explorations

As you might expect, some sections are much longer than others.

So what might you go to this site for? Not so much for seeking information as for browsing interesting stuff, possibly supplementing your regular study.

Ilike2learn.com

[www.ilike2learn.com/
ilike2learn/geography.asp](http://www.ilike2learn.com/ilike2learn/geography.asp)

Don't be put off by the comic sans right at the top! Actually, comic sans is used throughout the pages, and you'll have to get used to it...

Anyway, the site, as you'll see, is a bunch of Flash quizzes. So you click on



For the kids... almost

“Central Africa Map Quiz” and you’ll get a map of Central Africa, and you’re asked: “Where is Sudan?” Click the correct country and you get—hold your breath—five points!

Well, that wasn’t to undermine the usefulness of this little site. There are map quizzes for mountains, lakes, rivers, and more, besides countries. You’ll see “Belmopan is the capital of...” next to a map, and you’re asked to click the correct country. And so on. Probably useful for your first few lessons on political geography—not much more.

5.2 Civics

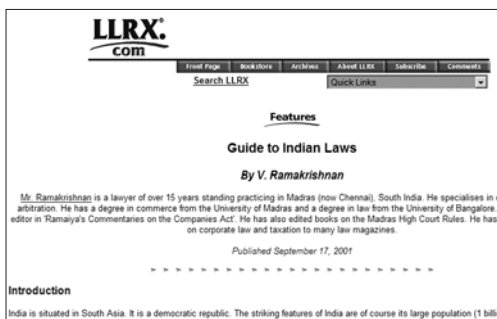
Guide To Indian Laws

www.llrx.com/features/indian.htm

On a negative note, there are some broken links on this page. But you didn’t expect government sites to always be operational, did you? In any case, this page itself is a gentle introduction to the Constitution of

India, the Union Executive, and so forth. It covers, in brief, such topics as the Independence of the Judiciary from the Executive, and Fundamental Rights and Duties.

There are several links on the page, and you’d be well advised to click on at least some of them. For example, there are links to the Election Commission and to the Reserve Bank of India.



Some basic information, and some links

Directory of official Web sites of the Government of India

<http://goidirectory.nic.in/>

“A one-point source to know all about Indian Government Web sites at all levels and from all sectors,” the site says about itself. It’s pretty good, since most of the links seem to work.

On the page are the following links:

- Executive: President of India, Central Government (ministries), and more
- Legislature
- Judiciary
- States and Union Territories

These are the main links you’ll want to follow; visit the page and you’ll find even more, such as the link to “Scientific & Research,” which lists out the Web sites of a ton of scientific and research bodies in India. All the links may not work, however, but there’s enough to choose from.



A one-stop bookmark

Now under “States & Union territories,” you get a link to the governmental organisations in each and every state. Let’s take a look at the first state, Andhra Pradesh. The links presented are the following...

Actually, there are tons of links, so we can’t talk about them all. But under “Government Departments” figures the Transport Department; under “Corporations” figures a site as obscure as that of the Andhra Pradesh State Warehousing Corporation; and so on. Many of the sites listed here have had their domains expired,

including the one we just mentioned, but many do work as well—for example, the link to the Agriculture Department of Andhra Pradesh.

This is one must-have bookmark for the civics student. At the time of this writing, it was last updated two days ago!

Law Library of Congress

www.loc.gov/law/guide/india.html

Surprisingly, there's a Library of Congress site that hosts links on Indian laws and more! At this well-maintained page, you'll find links to the Constitution, various branches of the Executive, Judicial departments, Legislative departments, and then a section called "Legal Rights and Miscellaneous."

Under that last heading are links to several Indian and American sites on law in India. Just one of the links—to findlaw.com—gives you links such as the following:

- CIA—The World Factbook Features facts and statistics on the geography, people, government, economy, communications, transportation, military and transnational issues.
- ForInt Country Page From Washburn Law School.
- AccountAid India Forms and basic information on Foreign Contribution Regulation Act (FCRA). Relevant for NGOs, non-profits, and grant-making agencies.

Law Library of Congress

Law Library of Congress | Global Legal Information Network | Library of Congress Guide to Law Online | About the Guide | International | Nations | United States | Index

India
Republic of India

CONSTITUTION

- [Constitution of India \(India Ministry of Law and Justice\)](#) in English
- [Constitution Finder \(University of Richmond T.C. Williams School of Law\)](#) in English
- [International Constitutional Law: India \(Universität Bern Institut für Öffentliches Recht\)](#) offers English translation and background notes

EXECUTIVE

- [President](#)
- [Prime Minister](#)
- [Cabinet Secretariat](#)
- [Ministry of Law and Justice](#)

contents

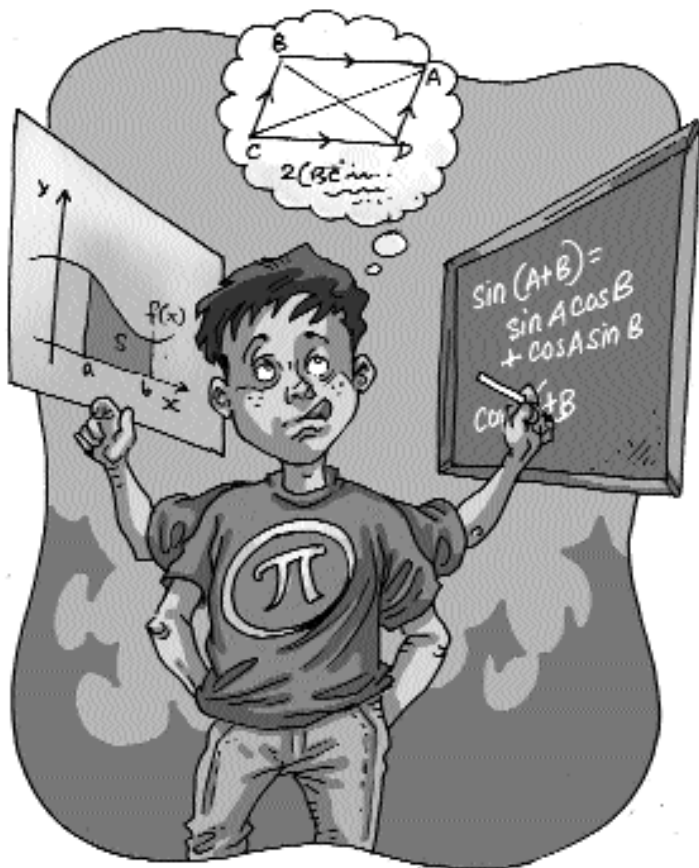
- [Constitution](#)
- [Executive](#)
- [Judicial](#)
- [Legislative](#)
- [Legal Guides](#)
- [General Source \(includes LC Portal: India\)](#)

Linkmania... indispensable!

- Caclub India Features tax law information and index of links.
- Corpmen Features Indian statutes.

Most of the links here work—and take you to all kinds of sites. In fact, the only problem we could find with the site we're talking about is that there are too many links, and links to links! But just bookmark this site and you've got almost everything there is to be known about India as a political entity—there's even a link to as intangible a thing as Human Rights in India. (The link works, and is depressing.)

Mathematics

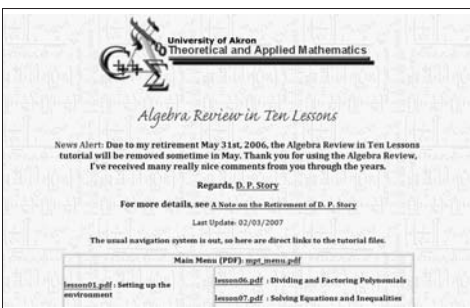


Mathematics is probably the toughest subject for any high-school student, dunce or genius. Here's a listing and review of some of the good maths sites on the Internet. There's mention of one page where you can find more links. Use some of or all these sites to amply supplement your textbook and your classwork.

6.1 Algebra Review in Ten Lessons

http://math.uakron.edu/%7Edpstory/mpt_home.html

As far as the page goes, this site is pretty simple: 10 PDFs for you to download. What we'll talk about here is the content of some of those.



What is most important (and valuable) about Prof D P Story's course (or "review") on algebra is the depth of understanding of the fundamentals it provides. Consider this, for example, from the first chapter:

"In this lesson, we review some very basic ideas and terminology of the so-called Real Number System. Do not take this first lesson lightly, your knowledge of the real number system and its properties is key to your understanding why certain algebraic manipulations are permissible, and why others are not. (When you are manipulating algebraic quantities, you are, in fact, manipulating numbers.)"

So you'd wonder why you need to know about the number system when learning algebra, and Story explains above—adding not to take it lightly. That should give you an idea about how comprehensive the course is.

Then, consider this snippet from chapter 2, something others would probably just skip, assuming the reader has gathered it from the preceding text:

"Terminology: The symbol a^k is called a power of a . We say that a^k has a base of a and that k is the exponent of the power of a ."

Everything is spelt out neat and nice, just like this. In addition, every definition is followed by a solid explanatory example.

Short quizzes pepper the material throughout. These help tremendously in nailing concepts into your head. The language is lucid and refreshingly non-text-bookish throughout, as you'll notice right upon first look.

Attention is called to important points using appropriate techniques. For example, while talking about $(1 / (x^2 + y^2)) = x^2 + y^2$ not being true, you'll see the following:

"The last point is only valid for expressions involving multiplication and/or division. For example, the following shall be referred to as an *algebraic blunder*!"

This is followed by "NOT TRUE" in bold. Why we mention this is to get across the point of the sheer usability of this text. As yet another example, the PDFs are colour-coded for good readability.

Chapters 3, 4, and 5, which you'll probably find the most useful, are basic algebra parts 1 and 2 followed by Expansion. Chapters 6 and 7 deal with polynomials and equations respectively. Chapters 8, 9, and 10 are more advanced.

If you can't follow what's going on in class, or if you need assistance with a particular type of problem, browse through the chapters and you're sure to find a lucid explanation. Story takes pains to explain each and every step of what's going on, which cannot be said about many textbooks (or professors). Highly recommended if you want a serious understanding of basic, and even not-so-basic algebra.

6.2 Webmath.com

www.webmath.org

The site is **www.webmath.org**, but it calls itself “Webmath.com.” We don’t know why, but the introduction goes, “Are you stuck on a math problem? We’d like to help you solve it.” What you get here isn’t a primer on maths of any sort, but, like the line says, it’s there to help you find a solution when you’re stuck.



Quick-jump to topics or browse Webmath

Help is available in various categories, including the usual suspects—trigonometry, calculus, algebra, and so on. There are two ways to use the site—one is by browsing the tabs, and the other is by “Quick Jumping” to a topic of your choice.

You can “Quick Jump” to the exact category of problem you’re looking for, in the “Quick Jump” drop-down. For example, if you’re thinking calculus, you can jump to Calculus—Derivatives, Calculus—Integration, Calculus—Solved Integrals, and Calculus—Quotient Rule.

As an example, when you jump to one of the above—say “Calculus—Integration”—you actually get to a page where you can type in an integral to solve! We tried this with x^2 , and we got a thoroughly well-worked-out solution. However, x^x didn’t quite work out, but then, as the page says, “This page can show you how to do some very basic integrals. It is not very ‘smart’ though, so do not be surprised if it cannot do your integral. It is best at integrals involving polynomials and trigonometric functions.”

Next, we jumped to “Geometry—Cylinders.” We got some notes on the properties of cylinders, and then a space where you

can type in various details of the cylinder you're working on, and get the answers you want. Pretty basic stuff. We gather there's quite a mix in the "Quick Jump" sections, ranging from simple to complex.

Now for the other way of using the site—the tabs. There happen to be seven tabs—Math for everyone, General Math, K-8 Math, Algebra, Plots and Geometry, Trigonometry and Calculus, and "Other stuff." Now for a look at each of these.

Under "Math for Everyone" is the really basic stuff like figuring interest, unit conversion, figuring lottery odds, and such. Quite a small section. "General Math" is just about as simple—you can calculate the LCM and GCD, converting decimals to fractions, and so on. "K-8" math is again basic, where you can, for example, "Get a visual on what a fraction is": you enter a fraction, and it shows a pie-chart.

"Algebra" is more like it: you have sections on Simplifying Expressions, Complex Numbers, Word Problems, and much more. Throughout, you type in your problem and you get a solution. Similarly, under "Plots and Geometry," you can type in a formula and get a visual plot. This section is organised such that you can not only get a "solution," but also learn something in the process.

"Trigonometry and Calculus" is just what it says. Of particular interest here is the "100 solved integrals." Choose your integral, and you get a scanned page that shows how it's worked!

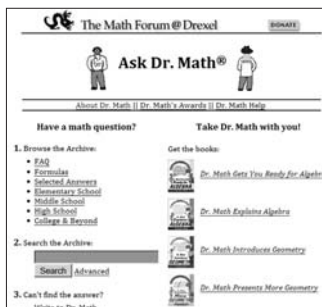
The "Other Stuff" section seems to be work in progress.

Overall, you'll find this useful if you're just starting off with trigonometry, calculus, or algebra, and if you're looking for quick answers. If you're looking for detailed knowledge, you'll need to look elsewhere.

6.3 The Math Forum @ Drexel

www.mathforum.org/dr.math/

An introduction to The Math Forum is provided right on the site: In 1994, the Math Forum discovered a dormant project called “Ask Prof. Maths,” where K-12 students could send in math questions and get personal answers. The folks at Drexel University decided to revive the program, using Swarthmore College math students as “Math Doctors”—students who loved to answer questions from other students.



The Math Forum: indispensable!

By 1995, the rapidly increasing volume of questions required that new members of the staff be recruited from other colleges around the US. By the year 2000, there had been over 300 volunteer “Doctors” from all corners of the globe. The service has received a number of Internet awards.

Students submit questions to Dr. Math by filling out a Web form. Answers are sent back by e-mail, and the best questions and answers are gathered into a searchable archive organised by grade level (elementary, middle school, high school) and topic (exponents, infinity, polynomials, etc.). The Forum recommends using the Dr. Math searcher to find what you want (try keywords like Fibonacci, fractal, or proof), and investigating the Dr. Math FAQ (topics include prime numbers, pi, the golden ratio, Pascal’s triangle).

The scope of the site really is too much to go into here. Every maths problem seems to have been covered! For starters, you can ask away and get your solution e-mailed to you, like we said. Then, you can search the forum in its entirety to find an answer to your question. We typed in “integral pi,” and got “FAQ” answers ranging from “Analytic Geometry: Cylindrical Coordinates” to “Ellipse and

Parabola Formulas.” Then there are all items with the words “integral” and “pi” in them, under “Items with keywords.” 206 of them. There’s also advanced search with the usual options.

We think the best way to use the site is to browse the categories—FAQ, Formulas, Selected Answers, Elementary School, Middle School, High School, and College & Beyond. Of interest to you will, naturally, be the last two.

Under “High School,” for example, is a list too long to mention here, but it includes all you’d want it to—calculus, algebra, trigonometry, and many, many more, some of them divided into sub-categories. Clicking “Calculus” leads to hundreds of results, including such ones as the following:

- “I’m trying to find a GOOD definition for “differentiation.”
- Could you please explain the formal definition of a limit? I need help specifically with finding a delta for a given epsilon and using the epsilon-delta definition of a limit.
- How do Lorenz equations work?
- Why is “e” so important? How significant is “e” compared with “pi”? How did it come about? How is it defined? Why is it taught only at higher level mathematics? Are there other numbers like “e”?

As an example of the kind of language the site uses—very student-friendly indeed—here’s part of the answer to that last question:

“Why is e so important? Well, in a sense, e is important simply because it has all those nice properties you’ve been studying. Whenever you take the derivative of e^x (that’s e to the power x), you get e^x back again. It’s the only function on Earth that will do that. That’s pretty cool stuff.”

However good (or bad) your professor is, and however good (or bad) your recommended textbook is, you can’t afford to miss out on The Math Forum!

6.4 Dave's Short Trig Course

www.clarku.edu/~djoyce/trig/

After calculus, trigonometry is one of the toughest areas of high-school maths to master. "These notes are more of an introduction and guide than a full course," as it says on the site. Use it to supplement your existing textbook.

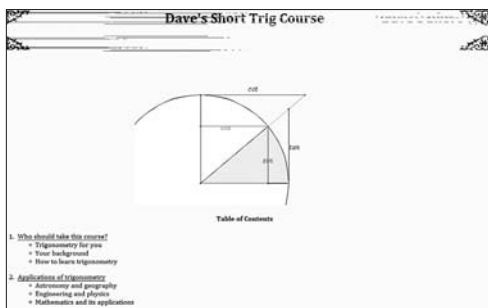
A Java applet on most pages helps explain the relevant concept.

It is indeed a short course, and it only covers the basics. However, it is worth going through if you

want to understand certain concepts you didn't understand in class. Here, for example, you'll find lucid proofs of why $(\sin A)/a = (\sin B)/b = (\sin C)/c$ —the law of sines—and the law of cosines. There happen to be just the right number of diagrams—not too many, not too few.

Several sections have helpful, somewhat easy questions, along with hints and answers.

Don't expect too much from this site, but it will help in getting the basics right. Students just getting exposed to trigonometry will find it particularly useful.

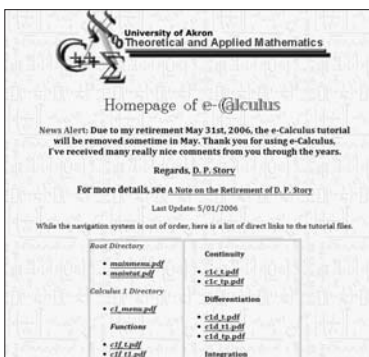


The "Short Trig Course" really is short, but useful

6.5 Homepage of e-Calculus

www.math.uakron.edu/%7Edpstory/e-calculus.html

As in one other site maintained by Prof D P Story that we've mentioned here, this one, too, is nothing site-wise: it's a collection of PDFs. You'll want to download them: they teach the subject well! Here's an extract from somewhere near the beginning of the course:



Prof Story (again), this time on calculus

“Assuming that you are not familiar with the technical aspects of this section, when you think about it, your knowledge of velocity is limited. In terms of your own mathematical background, there is only one type of velocity you can deal with: Constant Velocity. To make matters worse, there is really only one formula for dealing with velocity: the famous formula,

distance = velocity x time

“But the good news is that simple algebra is sufficient to solve many problems involving constant velocity. The bad news is that, based on life's experiences, velocity is hardly ever constant! One way around this problem is through the notion of average velocity. Even though the average velocity concept is very useful in many different situations, it is inadequate for a deeper study of the dynamics of motion of a particle. For this reason, we need a better understanding of velocity.

“This requires us to move to a higher mathematical plane: The Calculus level. It was the limit concept that enabled mathematicians to move from the algebraic level to the Calculus level.”

This is a kind of introduction you'll hardly ever find in a textbook; you're usually thrown straight into calculus without knowing why. Story's notes help you get the whole picture.

Short quizzes pepper the material throughout. These help tremendously in nailing concepts into your head. The language is lucid and refreshingly non-text-bookish throughout, as you'll notice right upon first look.

As an example of the method of pedagogy used, consider the following:

"You should verify in your own mind the validity of equality (19). But the limit in (19) is also the same difference quotient you would obtain if you were trying to calculate the derivative of $\sin(t)$ at the particular value of $t = x - \pi/2$ —here I have introduced a dummy variable for clarity. Study the argument carefully to assure your understanding." Much better than just "Hence proved."

If you can't follow what's going on in class, or if you need assistance with a particular type of problem, browse through the chapters and you're sure to find a lucid explanation. Story takes pains to explain each and every step of what's going on, which cannot be said about many textbooks (or professors). Highly recommended, if you want a serious understanding of basic and not-so-basic calculus.

6.6 EqWorld

<http://eqworld.ipmnet.ru/en/solutions/ode.htm>

Equations, more equations, then some more equations thrown in for good measure—that's what you'll find at this site. Not for the faint of heart or head, and, indeed, probably useful only as a quick reference for solutions to various advanced (and some not-so-advanced) equations.

Navigation at this site is as simple as it gets: you have exact solutions, methods, auxiliary sections (including integral transforms and more), and math forums—if you're in the market for equation solutions, you'll know where to go!

Under “Exact Solutions,” you'll find Algebraic Equations, Ordinary DEs, Systems of ODEs, First-Order PDEs, Linear PDEs, Nonlinear PDEs, Systems of PDEs, Integral Equations, and Functional Equations. Each solution is presented as a PDF, so you'll need to have Adobe Reader installed.

Well-known DEs are labelled: for example, $y'' + ay = 0$ (Equation of free oscillations).

There's a lot more on the site, but it probably won't interest you. Visit the site for the solutions you need.

6.7 Euclid's Elements

<http://aleph0.clarku.edu/%7Edjoyce/java/elements/toc.html>

Euclid's Elements is the most successful textbook ever written. It was one of the very first works to be printed after the printing press was invented, and is second only to the Bible in number of editions published. It was used as the basic text on geometry throughout the

1. $x'' = x^2 F(x, y), \quad y'' = g(y) F(x, y).$
 2. $x'' = x^{2n} F(x, y), \quad y'' = g(y) F(x, y).$
 3. $x'' = F(x, y), \quad y'' = G(x, y).$ Autonomous system of general form.
 4. $x' = f_1(x) g_1(y) \Phi(x, y, t), \quad y' = f_2(x) g_2(y) \Phi(x, y, t).$
 5. $x = \eta x', \quad y = \eta y', \quad z = G(x', y').$ Clebsch system.

3.2. Systems of Second-Order Ordinary Differential Equations; $x = x(t), y = y(t)$

6. $x'' = a f(ax - by) + g(ax - by), \quad y'' = x f(ax - by) + h(ax - by).$
 7. $x'' = x f(y), \quad y'' = y g(x).$
 8. $x'' = kx^{-3}, \quad y'' = ky^{-3}.$ $x = (t^2 + 1)^{3/2}, \quad y = (t^2 + 1)^{3/2}.$ Equations of motion of a point mass in gravitational field.
 9. $x'' = x f(y), \quad y'' = y f(x); \quad x = (t^2 + 1)^{3/2}, \quad y = (t^2 + 1)^{3/2}.$ Equations of motion of a point mass in central force field.
 10. $x'' = x f(x^2 + y^2, y) - y g(y, x), \quad y'' = y f(x^2 + y^2, x) + x g(y, x).$
 11. $x'' = -f(y) \ln(y) x', \quad y'' = -f(y) \ln(y) y' - x_1 \quad x = [(x^2 + y^2)^{1/2}]^{1/2}.$ Equations of motion of a projectile.
 12. $x'' = a f(x) = x^{-3} f(x), \quad y'' = a f(y) = y^{-3} g(y).$ Generalized Ermakov (Hermitean) system.
 13. $x'' = x^{-2} F(x, y, y'), \quad y'' = y^{-2} G(x, y, y').$ Generalized Ermakov (Hermitean) system.
 14. $x'' = f(y) x', \quad y'' = g(y) y'.$
 15. $x'' = x \Phi(x, y, t, x', y'), \quad y'' = y \Phi(x, y, t, x', y').$
 16. $x'' = x^{-3} f(y) = x \Phi(x, y, t, x', y'), \quad y'' = y^{-3} g(x) = y \Phi(x, y, t, x', y').$
 17. $x'' = F(t, x, y, y'), \quad y'' = G(t, x, y, y').$
 18. $x'' = x \Phi(x, y, t, x', y') + f(y), \quad y'' = -y \Phi(x, y, t, x', y') + g(x).$
 19. $x'' = \eta^2 \Phi(x, y, t, x', y') + f(x), \quad y'' = h^2 \Phi(x, y, t, x', y') + g(y).$
 20. $x'' = f(y) \Phi(x, y, t, x', y'), \quad y'' = g(x) \Phi(x, y, t, x', y').$

Want equations?

Algebraic Equations, Ordinary DEs, Systems of ODEs, First-Order PDEs, Linear PDEs, Nonlinear PDEs, Systems of PDEs, Integral Equations, and Functional Equations. Each solution is presented as a PDF, so you'll need to have Adobe Reader installed.

Well-known DEs are labelled: for example, $y'' + ay = 0$ (Equation of free oscillations).

There's a lot more on the site, but it probably won't interest you. Visit the site for the solutions you need.

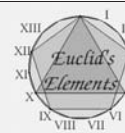


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Euclid's Elements: the definitive Web resource

Western world for about 2,000 years. For centuries, knowledge of at least part of Euclid's Elements was required of all students. Not until the 20th century did it cease to be considered something all educated people had read!

This page isn't just a PDF of the Elements—a Java applet helps you through many pages, and each proposition is made clearer under a heading called “Guide.”

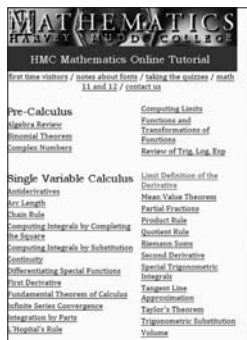
If you know about the Elements, you'll know there are 13 Books, each containing Definitions and Propositions (some contain only Propositions). Here, along with all the Books, Definitions and Propositions, you have introductory matter: about Euclid, “A quick trip through the Elements,” references to Euclid's Elements on the Web, and more.

If you need to learn Euclid's Elements, the place to head for is here. And even if you're not a maths student, you might find some intellectual stimulation in the Elements—and the satisfaction of knowing that you have your geometry fundamentals all correct.

6.8 HMC Mathematics Online Tutorial

www.math.hmc.edu/calculus/tutorials/

This is a straightforward, no-nonsense guide to key mathematical areas—Single-variable Calculus, Multi-variable Calculus, Linear Algebra, and Differential Equations. Note that the last is limited to first-order DEs. Before jumping into calculus, there is a primer on several things you'll need to know—a Review of Trigonometric, Logarithmic, and Exponential Functions, a review of algebra, the binomial theorem, complex numbers, and more. These are short, but essential.



Just a regular tutorial

Then comes single-variable calculus: the chain rule, the fundamental theorem of calculus, integration by parts, the Second Derivative, Taylor's Theorem, and such.

Although the general language and presentation is like that in most textbooks, you'll find useful explanatory notes here and there, like this one before the proof of the fundamental theorem of calculus:

"We are all used to evaluating definite integrals without giving the reason for the procedure much thought. The definite integral is defined, however, not by our regular procedure but rather as a limit of Riemann sums. We often view the definite integral of a function as the area under the graph of the function between two limits. It is not intuitively clear, then, why we proceed as we do in computing definite integrals. The Fundamental Theorem of Calculus justifies our procedure of evaluating an antiderivative at the upper and lower limits of integration and taking the difference."

Also, in the explanations and proofs, certain terms are hyperlinked to short definitions, which appear as pop-ups.

Multi-variable calculus continues along similar lines, covering multiple integration, parametric equations, partial differentiation, and related topics.

Eigenvalues and eigenvectors, matrix algebra, the geometry of linear transformations and more come under Linear Algebra, as you're probably aware. Finally, like we said, Differential Equations covers only first-order DEs.

The text is peppered with short practice questions, albeit not in good doses. The solutions are linked.

Finally, there's also a link to "Math Fun Facts," which are, as the site says, "ideas and puzzles that will change the way you think." The "fun facts" are classified into "easy," "medium," etc.

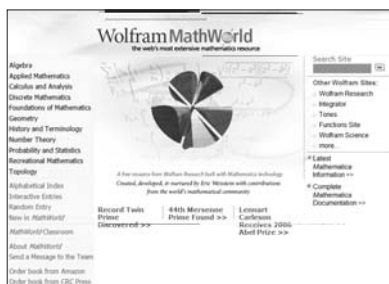
continue to maintain it for a while,” as the author of the page says—so get the online textbooks you want here!

You'll find the entire gamut of mathematics in these books—graph theory, calculus, differential equations, linear algebra... in fact, no less than 68 titles available for free.

6.11 Wolfram MathWorld

<http://mathworld.wolfram.com/>

12,646 entries. The big daddy of all the maths sites there are on the Web, Wolfram MathWorld is your single stop for everything maths—with a caveat: you'll sometimes need to wade through incomprehensible stuff to get to something simple enough for you to understand!



Ah, Eric Weisstein again!

We clicked randomly and ended up at this one: “Cube Division by Planes.” It turns out that the average number of regions into which n randomly chosen planes divide a cube is $(1/324)(2n + 23)n(n-1)(\pi) + n + 6$. Duh.

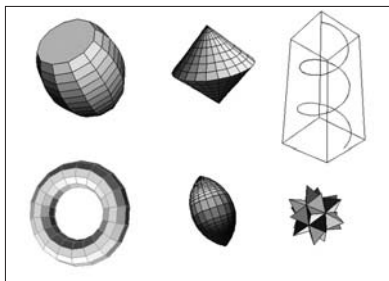
Well, let's re-start on a more positive note: you can browse by category, which leads you to sub-categories. The “leaf” category has the number of entries next to it in brackets. So you click “Probability and Statistics,” and you get Bayesian Analysis (1); Descriptive Statistics (62); Moments (57); and so on.

The “Bayesian Analysis” link above is typical. You can comment on the page, via a link at the top; the descriptive text follows, with hyperlinks for difficult terms. Then comes something

about where it is or has been applied in the real world. And then, there's a "See Also" section, which, of course, links to multiple related pages. Then come the references, and the date last modified.

The broad categories at the site are Algebra, Applied Mathematics, Calculus and Analysis, Discrete Mathematics, Foundations of Mathematics, Geometry, History and Terminology, Number Theory, Probability and Statistics, Recreational Mathematics, and Topology. There's also an alphabetical index of entries, which would be difficult to use, we presume, since one doesn't know the headings of all the entries!

"Interactive Entries" takes you to animated GIFs, "LiveGraphics3D Applets," and "webMathematica Examples." Under the second heading, we took a look at one entry called "Axis"; this one gives you a simple demonstration of what an axis is. Of course, it's simple



Stuff you can visualise at Weisstein's site

enough to understand what an axis is without having to view an applet, but what about a gyrate rhombicosidodecahedron? No, seriously, that's an object, and it doesn't look interesting in the least, to boot. See the image alongside to see what a barrel, a bicone, a spiral, a homotopic, a lemon, and a spikey look like.

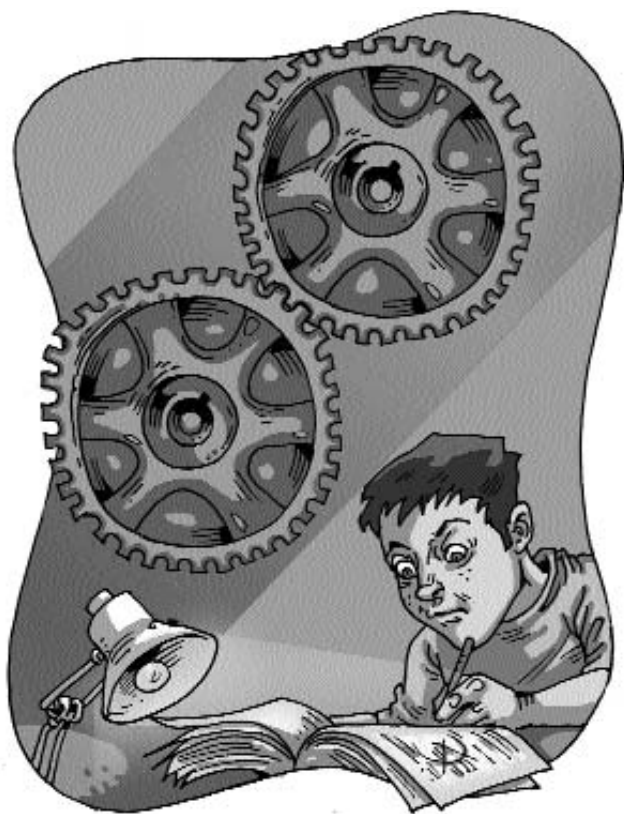
Coming to the "webMathematica Examples," these are things you can re-plot and manipulate. For example, the entry under "logarithm" shows a log graph, and you can enter minimum and maximum values for the axes—and you'll get a new graph. Below the graph is a description of the concept.

Whatever your topic, you're dead sure to find it here. Say you don't understand Kepler's Equation: head over to calculus, then to

functions, and there it is. It's that simple. Every important term in your textbook is explained here, usually with a graph and all the important equations.

This site is strictly for college students. High-school kids beware: this site will make you feel like Newton on the sands of knowledge, drilling it into your head that you don't know much.

Engineering



Engineers build nations. In fact, once you cross the boundaries of conventional thinking, the potential is limitless. At the far end of imagination, science fiction writers dream of planetary and stellar engineers in our galactic future. But we will leave exploring the educational resources for those engineers for a future edition of *Fast Track*... ask your great-grandkids to keep an eye out for the April 2157 edition!

When compiling a list of engineering education resources, we're faced with the decision of what to include and what to leave out. This chapter will hopefully make most happy; most, but not all. So with apologies to all you budding engineers, here's a bunch of appetizers to get you started...

7.1 Engineering—The Wikipedia Entries

<http://en.wikipedia.org/wiki/Engineering>

<http://en.wikipedia.org/wiki/Portal:Engineering>

Engineering is huge. To give a brief overview of areas that engineering covers can take up an entire *Fast Track* in itself! Thankfully, we don't need to do that. The Wikipedia entries are more than comprehensive. You have two resources on Wikipedia: the



Wikipedia's Engineering entries are well-hyperlinked

Engineering article, which is an overview of the entire discipline, as well as the engineering portal, which is a more in-depth look at the field and its many branches. What started out as independent branches of study are increasingly becoming strong in inter-disciplinary skill requirements. The portal will be useful in helping you keep up-to-date with the entire field while keeping you in touch with your branch of study as well.

7.2 Massachusetts Institute of Technology | OpenCourseWare

<http://ocw.mit.edu>

The OpenCourseWare (OCW) education program is a free and open online educational resource made available by many universities around the world. One of the major contributors to this program is the world-renowned Massachusetts Institute of Technology (MIT). Through the OCW program, you get access to the teaching syllabus, lecture notes, and textbooks used in many of the courses taught at MIT.



Take a look at the MIT syllabus and more

The one thing to note is that the OCW is not a distance education program through which you can get a formal degree or certificate. You can supplement OCW with your regular work to get high-powered insights into your area of study, or just take a course because of your passion for the subject.

You don't not get "formal" access to the MIT faculty through OCW, but you do get access to archived assignments and exam papers. You can also use the discussion groups to help you in your studies and get feedback from members of the discussion groups. However, don't expect it as your due. Be courteous: the teachers / professors who may respond will not necessarily be from MIT, but are drawn from the worldwide teaching community participating in the OCW project. They are devoting their time to the project for free.

Depending on the course, there may be additional technical requirements that your PC will have to meet. For example, some courses have video lectures that you will need compatible media players to view (e.g. Real Player). Others maybe packed as ZIP files which you will have to download. The download sizes can vary, anything from 1 MB to 100 MB. You can also subscribe to RSS feeds from the departments to keep you updated about new courses that may be published.

7.3 OpenCourseWare Finder

<http://opencontent.org/ocwfinder/>

Unable to find the course you're interested in? Not to worry. With the OpenCourseWare finder, this is a snap. Simply select a topic of interest, and use the filters to narrow down the selection of courses on display. You can set filters up to a maximum of four levels.

One advantage with the OCW Finder is that it is not just searching through courses from MIT, even though predominantly engineering courses are only from MIT. The course content from six universities / institutions has been indexed by the OCW finder and matching results are dis-

[illegible]

Find your Course—OpenCourseWare Finder

Also check out the site homepage (<http://opencontent.org>) to find out more. There is also a Google custom search engine for searching across the OCW sites (<http://opencontent.org/googleocw>).

Also, bookmark the OpenCourseWare Consortium's page for finding courses online (www.ocwconsortium.org/use/index.html). There is a wealth of universities from around the world who have published courses under the OCW program.

7.4 Engineering Formulas

eFunda

www.efunda.com

This is an online reference site for engineers and engineering students who want a quick way to access a forgotten formula. It also contains quick reference information regarding many engineering topics. It is a paid site—about Rs 300 per month or for students about Rs 1,800 per year. Currently you also get a preview period when you first access the site, so you can go through the actual contents before deciding on whether you want to become a member or not.



eFunda—Formulas in a snap

Formula Sites' Index

www.roymech.co.uk/Useful_Tables/Form/Formula_Index.html

This index leads to many sites (including eFunda).

7.5 Applied Mechanics (Engineering Mechanics)

http://en.wikipedia.org/wiki/Applied_mechanics

Applied Mechanics or Engineering Mechanics as it's more commonly referred to as, is a foundation course for many branches of engineering including Civil and Mechanical. The Wikipedia link will give you a general overview of the subject including interesting historical information.

Statics and Mechanics of Material

<http://claymore.engineer.gvsu.edu/~jackh/eod/egr209.html>

This course is somewhat older (1996-98) but is useful as a quick reference for most of the basic concepts. It also includes an overview of presentation techniques for engineers, which is something that is lacking in most engineering courses. Written and oral presentation of reports is an important part of both academic and professional life. Follow the "Units, Material Properties and a Math Handbook" link to find the instructions on honing your presentation skills. Since this is somewhat old, quite a few of the links are dead or require additional software. The downloadable files with the MCD extension require the MathCAD software.

Self Assessment: www.lboro.ac.uk/faculty/eng/engtlsc/Eng_Mech/tutorials/tut_index.htm

This site allows you to test yourself in several key areas of Statics and Dynamics. Each topic has a set of multiple choice questions which you can answer online and get feedback on your performance with the correct solutions, after you answer the questions. As with all such self assessment systems, it is a good idea to prepare yourself before attempting or even looking at the answers. This will help you get a genuine idea of your grasp of the subject and test your scoring capability.

7.6 Design Handbook

<http://pergatory.mit.edu/2.007/Resources/index.html>

The design handbook is a collection of notes gathered over the years by many professors and teaching assistants at Cambridge University and MIT. The topics covered include the basics of design, how machine elements are used in machines, tips on how to analyse and prove your design, instructions on engineering drawing, basic information on how to machine parts using machine tools, instructions for making machine elements in specific MIT labs, as well as general data on various aspects of materials, their properties, formulas, and so on.



Learn design basics—for machine and machine parts

7.7 Basics of Computer Programming

The strength of a building's stability is its foundation. Similarly these foundational courses will take you to the top of the programming elite.

Structure and Interpretation of Computer Programs

<http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-001Spring-2005/CourseHome/index.htm>

For any geek looking for a foundational program in programming, MIT Course 6.001—Structure and Interpretation of Computer Programs is the bedrock. This course creates a solid awareness of the programming environment and uses a version of a high level programming language called LISP. In many ways all the popular

programming languages of today are subsets of LISP. What can be written in one line in LISP may require 3-4 or even more lines in other languages. Course 6.001 uses an academic version of LISP called Scheme. The Structure and Interpretation of Computer Programs is also a text book that is somewhat of a classic in software engineering circles. The entire textbook is available online too, so you have access to the exact same literature as MIT students. And if you are too lazy to read but would rather watch, you can download the video lectures of the course from here: <http://swiss.csail.mit.edu/classes/6.001/abelson-sussman-lectures>.

Online C & C++ courses

www.macs.hw.ac.uk/~rjp/Coursewww/

Any programmer worth his or her salt should understand C and its elder brother, C++. As programming languages go, C and C++ are high level, but basic languages, that are important to gain an understanding of how programming affects the machine. If you are a bit overwhelmed by the MIT course you may skip that and delve right into Professor Pooley's course on C and C++. To effectively use C++ you will need to know C. Both courses are available online and divided into sections. At the end of each section there is a "Programming Milestone"—an exercise segment that will test your grasp of the preceding chapters. After working out the exercises you can check your answers by clicking on the link provided.

Introduction to Programming Using Java

<http://math.hws.edu/javanotes/>

This is a comprehensive course meant for the beginning programmer. It covers the majority of Java 5.0 and will quickly get you up and running. There are exercises, quizzes and solutions with which you can test and grade yourself. You can also download a copy of the entire site for offline browsing. This is especially useful when you don't want to stay connected to the Net for too long.

7.8 Mechanical Engineering

FreeStudy

www.freestudy.co.uk/home.htm

This site is a free online tutorial site primarily related to Mechanical Engineering mapped to the Engineering Council's (UK) exams that enables you to achieve Chartered Engineer Status. The contents of the tutorials are pretty exhaustive, and you will need to choose (or skip) the areas of study depending on what is of particular relevance to you. You can view the courses by different classes or by course modules.

Strength of Materials

<http://physics.uwstout.edu/StatStr/index.htm>

There are two introductory courses on this site—Strength of Materials and Statics and Strength of Materials. The emphasis of the course is more on the practical side and less on the theoretical, so it's a good resource for those looking to get a greater insight into the practical applications of various theoretical concepts. A whole range of topics are covered, from Statics of Simple Structures, Columns, Combined Stresses, and Mohr's Circle. There are class lectures, examples, problem assignments, sample tests and their solutions and much more. Rather than treat this site as your sole resource it is advisable to use it as a companion to your textbook material.

Fluid Mechanics

Online Course for Civil Engineers

www.efm.leeds.ac.uk/CIVE/CIVE1400/course.html

This site contains a well-structured online course with a primary focus on civil engineering students. There are detailed course notes, problems with their solutions along with previous exam papers (University of Leeds).

Fluid Mechanics Help

www.onesmartclick.com/engineering/fluidmechanics.html

Contains links to many fluid mechanics related resources including books on Amazon.com, forums and other sub-topic oriented Web sites. As a directory of links on Fluid Mechanics this is a good resource, however don't be surprised if you see the occasional dead link.

Fluid Mechanics Tutorials

www.fluidmech.net

This site is the result of one person's fascination with fluid flow. There are a range of topics covered from deeply mathematical to the "purely visual and physical." The tutorials go into some depth and are relatively easy to understand. Apart from the Tutorials, there is also a collection of JavaScript calculators that can be used to calculate results for various fluid flow related problems.

7.9 Electronics Engineering

Circuit Analysis

www.et.uncc.edu/elet_info/CircuitTutor/CircuitTutor.html

This is a quick and simple site and helps you quickly get the grasp of the basics of Circuit Analysis. There are four PDF links that explain the different methods of analysis: Mesh, Nodal, Thevenin & Norton, and Load Line Analysis.

www.eas.asu.edu/~holbert/ece201/recipes.html

This is another site that includes an even briefer explanation of the various analytical methods but includes apart from the above four: source transformation and superposition as well.

<http://home.comcast.net/~stager21/Circuits.html>

This is an online textbook on circuit analysis and pretty much covers the entire subject. The only drawback is that it is one continu-

ous page and may prove difficult to read or jump through. You can alternatively copy the text into a word processor document and save it to your hard disk.

Semiconductors

<http://ece-www.colorado.edu/~bart/book/title.htm>

This is the online version of the book *Principles of Semiconductor Devices* by Zegbroeck and gives a very good introduction to semiconductors. The site is well organized and gives you one-click access to many resources like examples, problems, review questions and equations. Each chapter and its sections can be reached with a single click from the Table of Contents making it very easy to navigate and hence, to read this book.

<http://www.boin-gmbh.com/linkpage/indgui.htm>

The semiconductor industry is a multi-billion dollar segment. This collection of links not only gives you access to some basic resources on semiconductors but also helps you understand the manufacturing processes involved in the making of silicon chips. It also provides a crucial overview of the international semiconductor market which help you understand how the marketplace works.

Computer Science and Programming

By virtue of it being the source of the Internet, the material available on the Web covering the computer science branch is extensive. This collection of links is by no means complete but are the ones we found to be specially useful.

Theory of Computation

www.cs.bu.edu/~lnd/toc/

This site offers a collection of notes on the fundamentals of computing that can be used as an aid or a quick reference guide. You will need to use this site in combination with your regular textbook but can benefit from the contribution of several other students who have contributed to the notes in the various sections.

7.10 Computer Organization / Architecture

<http://williamstallings.com/COA5e.html>

This site is a companion site to the textbook, *Computer Organization and Architecture* by William Stallings. Ideally it should be used in conjunction with your textbook but can also serve as a rough standalone guide as well. There are extensive chapter-wise links to various sites, additional support materials in the form of student resources, figures, notes, PowerPoint slides, and downloadable software. Additionally there are links to various university courses that use this textbook, which in turn contain useful links to various other sites on several aspects of the subject.

7.11 Free Online Training Courses

www.e-learningcenter.com/free.htm

This site offers about nine e-learning courses, from UNIX shell programming to A+ Certification training. Note that these courses may not be so “deep” given that all the courses do not last more than a few

hours. It is primarily an incentive program for their more full fledged e-learning courses. However, the course will give you feel of an online learning environment and you can decide for yourself whether such an approach is suited to your personal preferences.



Free Online Courses

HP Online Classes

<http://h30240.www3.hp.com/index.jsp>

HP Online Classes is brought to you by none other than HP—yes,

Engineering, Computer Architecture, and more. Each course may have one or more links leading to the video lectures hosted at that educational institutions' own servers.

Free Computer Books, Tutorials and Lecture Notes

<http://freecomputerbooks.com/>

This collection of computer books, tutorials and lecture notes is exhaustive. There is study material covering at least eight categories of computer science topics and in addition you have links to free technology and IT related print magazine sites, additional IT reference sites and other books sites. Many of the books have multiple listings as they are available in more than one location on the Web. This is helpful if the main site goes down and you can then quickly jump to a 'mirror' site and get the book. You can either browse through the categories and drill down to find your book or you can search through the entire collection to find something which will fit your requirements.

Cryptography

www.cs.washington.edu/education/courses/csep590/06wi/

This is the public archive of a course on Cryptography conducted at the University of Washington's—Computer Science and Engineering department. For those of you involved in ethical hacking, security or just cryptography—this course can provide a fillip to your regular studies. The entire course is available online in a set of 8 assignments as downloadable PDFs. When you finish each assignment you can download the answers/solution documents (PDT, PTT and/or txt) and compare your performance and rate yourself.

Stanford Computer Science Education Library

<http://cslibrary.stanford.edu/>

This is an online Computer Science library of Stanford University, and contains links to PDF books, video, and other material dealing

with basic programming concepts. Useful for reference and studies as well, any computer science student or programmer should make it a must to review the material on this site and update any gaps in your knowledge.

Free Tech Books

www.freetechbooks.com

Free Tech Books is another online collection of various books and lecture notes related to various topics within computer science and engineering. There are hundreds of books on various topics divided into: Computer Science, Related Fields (like Math etc), Operating System books, Programming/Scripting books and more. The site is well organised and all the books are either downloadable or you have full free access to their HTML versions on the parent site. You can also subscribe to the RSS feed to stay updated.

7.12 Electrical Engineering

Electronic Components

<http://ourworld.cs.com/gknott5413/>

This introduction to electronics is both for beginners as well as intermediate students. The site provides basic information on all the concepts and components used in electronics and will work as a quick reference guide which you can use to refresh your memory from time to time.

http://science-ebooks.com/electronics/table_of_contents.htm

This site offers a more comprehensive introductory text but deals with the basics of electrical and electronics theory and practice including discussions on basics like matter and electricity, ohm's law to advanced topics like semi conductor manufacturing. Most of the chapters have both a text portion as well as simulated animation of many electrical phenomena which aids in understanding the concepts. One additional feature is that the text is available as a download in either PDF e-Book form or as an audio book.

<http://williamson-labs.com/>

This site has many tutorials but more from a hobbyist and electrical/electronics enthusiast's point of view than on the basis of any rigid academic syllabus. Of course, there will not be much difference in the conceptual treatment but the instruction style is more informal and conversational plus there are tons of animations that make understanding much easier.

Operational Amplifiers

www.cs.manchester.ac.uk/Study_subweb/Ugrad/coursenotes/CS1231/tutorials/index.html

If you are having trouble getting a grasp of amplifiers, this collection of tutorial and notes will give you some additional insight into operational amplifiers. The tutorials are interactive and demonstrative, and take you through the basics of operational amplifiers, non inverting amplifiers, the ideal op-amp, and real op-amps. The interactive tutorials are Java-based and the well-designed layout enables you to navigate through the pages with ease. There is also a PDF download explaining how to use and understand the interactive tutorials and how to run the various simulations. Each tutorial also has multiple quiz questions which you can answer and then click on the "Reveal Answer" button to get the correct answer and do a self-check.

7.13 Computer Engineering

Operating Systems

http://en.wikipedia.org/wiki/Operating_system

Operating systems is a huge and complex subject. This Wikipedia entry summarises and gives you a high-level overview of what an operating system is and what it does.

<http://williamstallings.com/OS4e.html>

This is another list of resources from William Stallings on operat-

ing systems and is a companion to the text book *Operating Systems*, Fourth Edition. While you will get maximum benefit by using the site in conjunction with the book, it is useful if you are looking for more information on any particular area of the operating system.

There are many links to UNIX and Windows resources as well as a student resource site, PDF downloads of relevant excerpts from the book, and much more. There are also links to many university courses that use the text book in their teaching.

http://physinfo.ulb.ac.be/cit_courseware/opsys/ostart.htm

This is an introductory free course on operating systems and will help you quickly understand what an operating system is and what it does, do basic tasks in UNIX (Linux) or Windows, understand what is meant by process, scheduling, file management, memory, differentiate between a thread and a process, and much more. The course is largely in a question and answer form which makes it very easy to read and understand. There are also some basic assignments and test which you can take to test your understanding of the subject

Microcontrollers and Microprocessors

<http://mic.unn.ac.uk/miclearning/modules/micros/ch1/micro01notes.html>

This is a basic introduction to Microcontrollers and Microprocessors. It gives you the basic history of microprocessors, the types of memory, digital I/O, and what a microcontroller is. This short course will quickly get you up to speed on what a microcontroller is and help you get a quick overview on the subject.

Object Oriented Programming

<http://www.aonaware.com/OOP1.htm>

The object oriented programming model is what drives all quality software development in today's world. This course is a brief look into OOP and explains the difference between Objects, Classes, and Inheritance.

<http://homepages.north.londonmet.ac.uk/~chalkp/proj/ootutor/ooopconcepts.html>

This site, too, teaches OOP, but goes on to include the advanced topics: encapsulation and polymorphism as well. In addition, there are tests on each of the concepts that will further help you understand the concepts.

<http://homepages.north.londonmet.ac.uk/~chalkp/proj/ootutor/ooopdesign.html>

Once you've got a handle on OOP the next obvious logical step is to perfect your OOP Design. This site shows you how. It teaches you both UML as well as graphical notation and also has a test to evaluate your understanding on using both these design notation formats.

Commerce



Commerce is a mix of theoretical and practical subjects. Accounts, taxation and statistics are practical, whereas other subjects such as economics, business organisation and management are theoretical in nature. Most of the information available on the Web is either in the form of news or research journals. Besides reference books, online libraries like www.questia.com allow you to view books online, but for the price of a subscription fee. Let's take a look at what commerce students can use online...

8.1 Accountancy

Though known by different names in various countries, the basic function of Accountancy remains the same. What people call a Certified Public Accountant in the US is called a Chartered Accountant in our nation. Accountancy is one subject that needs a very clear understanding of the basics, or else you'll never get it right. Here are a few sites that will help you do just that.

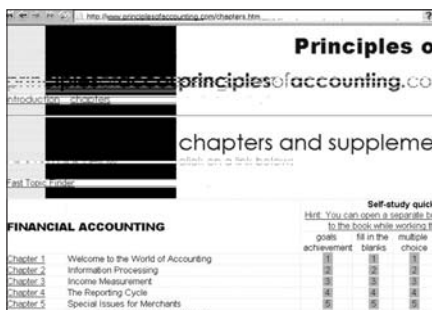
8.1.1 Principles of Accounting

<http://www.principlesofaccounting.com>

As the name suggests, the site offers content to learn more about principles of accounting for Financial Accounting and Managerial accounting. It's like a complete online textbook with a chapter for each accounting principle.

Just click on the chapter that interests you—you will find it easy because the site uses actual Accounts to illustrate the changes taking place at the elementary level.

Self-study links are provided so that you can check your progress. There are ways you can test yourself—fill in the blanks, multiple choice and checklists with key terms, etc. Let's say you want to learn about Inventory (Chapter 8 on the site) and



The site is simple enough to navigate...

EDLEWEISS COLLECTS AN ACCOUNT RECEIVABLE. If Edleweiss Corporation collected \$10,000 from a customer account receivable (i.e., not a new sale, just the collection of an amount that is due from some previous transaction), the following would be revised as follows:

EDLEWEISS CORPORATION Balance Sheet December 31, 2003 (before indicated transaction)		EDLEWEISS CORPORATION Balance Sheet December 31, 2003 (after indicated transaction)	
Assets		Assets	
Cash	\$ 25,000	Cash	\$ 35,000
Accounts receivable	50,000	Accounts receivable	40,000
Inventory	30,000	Inventory	30,000
Land	125,000	Land	125,000
Buildings	400,000	Buildings	400,000
Equipment	200,000	Equipment	200,000
Other assets	15,000	Other assets	15,000
Total assets	\$805,000	Total assets	\$805,000
Liabilities		Liabilities	
Accounts payable	\$ 10,000	Accounts payable	\$ 10,000
Notes payable	120,000	Notes payable	120,000
Total liabilities	\$130,000	Total liabilities	\$130,000
Stockholders' equity		Stockholders' equity	
Common stock	\$125,000	Common stock	\$125,000
Retained earnings	550,000	Retained earnings	550,000
Total stockholders' equity	675,000	Total stockholders' equity	675,000
Total liabilities and equity	\$805,000	Total liabilities and equity	\$805,000

This illustration plainly shows that cash (an asset) increased from \$25,000 to \$35,000, and accounts receivable decreased from \$50,000 to \$40,000. As a result total assets did not change, and liabilities and equity accounts were unchanged.

...and you'll find a lot of practice problems

say you want to learn about Inventory (Chapter 8 on the site) and

you click on the chapter number. While reading the chapter if you want to test your skills, just click on Goal achievement, Fill in the blanks, Multiple choices or problems.

The language used on the site is easy to understand, and the self study material is objective in nature, so you won't get bored. It's true that the site uses mostly US-based theory for accounting principles and standards, but it's pretty close to what we learn here.

If you want to know how to balance a sheet, a picture of an actual Balance sheet is provided, which makes it easier for you to understand what's being taught. Similarly, different accounting concepts relating to Financial Accounting and Management Accounting are discussed separately in the chapters.

Another noteworthy thing about this site is the *Supplements* link, which has an Index Search option with a chapter-wise Glossary of terms by alphabets and chapters. The checklist is a handy tool. Check the items which are likely to be important for your exams or syllabus and chapter- and topic-wise problems are listed for testing the ability to solve them. Also, the key terms and definitions are listed below the checklist items listed. You can read and then click on any term, say "Dividends", and you'll get go to the page that tells you everything you need to know about dividends. This is a good Web site for practising accounting principles, and getting your basics right.

Excerpts

Current Liabilities

CURRENT LIABILITIES: Existing obligations that are due to be satisfied in the near term, and include amounts like accounts payable, salaries, utilities, taxes, short-term loans, and so forth make up the current liabilities section. This casual definition is inadequate for all situations, so accountants have developed a very specific definition to deal with more issues: current liabilities are debts that are due to be paid within one

year or the operating cycle, whichever is longer; further, such obligations will typically involve the use of current assets, the creation of another current liability, or the providing of some service. This enhanced definition is expansive enough to capture less obvious obligations pertaining to items like customer prepayments, amounts collected for and payable to third parties, the portion of long-term debt due within one year or the operating cycle (whichever is longer), accrued liabilities for expenses incurred but not yet paid, and contingent liabilities. However, the definition is not meant to include amounts not yet “incurred.” For example, salary to be earned by employees next year is not a current liability (this year) because it has yet to be “incurred.”

THE OPERATING CYCLE: Remember that the operating cycle is the length of time it takes to turn cash back into cash. That is, a business starts with cash, buys inventory, sells goods, and eventually collects the sales proceeds in cash. The length of time it takes to do this is the operating cycle. Take careful note of how the operating cycle is included in the above definition of current liabilities: “one year or the operating cycle, whichever is longer.” For most businesses, the operating cycle is less than one year, but not always. A furniture manufacturer may have to buy and cure wood before it can be processed into a quality product. This could cause the operating cycle to go beyond one year. If that is the case, then current liabilities might include obligations due in more than one year.

8.1.2 Future Accountant

<http://www.futureaccountant.com>

Future Accountant is a site with a snazzy name which has information on how to make a mark as a CA (Chartered Accountant), CWA (Cost and Works Accountant) and CS (Company Secretary) with a step by step approach of achieving them. It's an Indian site run anonymously by the group Krishbhavara.

The first part consists of the Almanac—basic information about various options in Accounting itself. For prospective beginners, CA/CS/CWA—Foundation, Inter and Final students; Almanac information about the attributes of the profession, exam dates

and even time is quoted! Interestingly, each level has its own FAQs and quite lucidly written responses. That section also includes information from registration for professional accounting courses to various other topics such as lost mark sheets are covered in this Almanac/Information section.



Future Accountant—all for Indians

The section “Academic content” is filled with information on what is taught at the Higher Secondary and college level. It feels like the textbooks are filtered and simplified. The academic content available is divided into Financial and Cost and Management Accounting. Under Financial Accounting, five major topics are covered—Basic Accounting Process, Bank Reconciliation Statement, Final Accounts, Consignment Accounts and Partnership Accounts.

Each topic of Accounting is explained right from basic definition to its application by illustrations. Concepts (like Capital, Profit, Loss, Drawings, Debtors, Creditors, etc.), are explained using real-sounding examples of a people and problems. Journal entries of the transactions are also illustrated thusly, to provide a better understanding of the affects of each entry on an account.

The site explains subjects in simple and lucid language using illustrations appropriately. It's very useful for beginners or intermediate students as a quick reference guide. You can enrol as a student to gain access to the Online Classes, which at present, includes only a few topics. This site is a good source for Indian students who want a simple and easy reference over and above their regular curriculum.

Excerpts

Does Accounting Start with writing the Journal?

Because we had been learning the fundamental concepts we started with learning what a journal is and how the ledger is derived. But if you have to design an accounting system, then you should start somewhere else. It would not be like you start writing the journal entry and then create whatever new ledger accounts you come across always.

We Prepare the List of Ledger Accounts First

What we do first is think of all the ledger accounts that are to be maintained within the organisational accounting system. Why? Remember, the basic purpose of accounting—Derivation of information. The more information we need, the more accounting heads we have to maintain (or the more the number of elements into which we have to divide the organisational accounting). Therefore based on the organisational information needs, one has to decide on the various accounting heads that are to be maintained.

Use the accounts within the list of ledger accounts only

Then at the time of recording the transactions i.e. writing down the journal, only these accounting heads are to be considered to assess the two elements affected by the transaction.

Example

Say for example, if the organisation thinks that it does not need too much detail about all the expenses relating to the office like, office rent, telephone, electricity, maintenance etc., it can create one account for this say by name “Office Expenses” and use it whenever any of these expenses are incurred. When office rent is paid in cash, the elements/account heads that are affected are “Cash a/c” and “Office Expenses a/c”; similarly when office telephone charges are paid by a cheque, the elements/account heads that are affected are “Bank a/c” and “Office Expenses a/c”.

But if the organisation has decided that it needs this information separately then they create different accounts for these like “Office Rent a/c”,

“Office Telephone Charges a/c”, “Office Electricity Charges a/c”, etc., and these accounts will be taken into consideration while dealing with the transaction, i.e. when office rent is paid in cash, the elements/account heads that are affected are “Cash a/c” and “Office Rent a/c”; similarly when office telephone charges are paid by a cheque, the elements/account heads that are affected are “Bank a/c” and “Office Telephone Charges”.

8.2 Taxation

Tax Laws and rules as laid by the Government are taught at colleges. If you're looking for something that will help you beyond your textbooks, the best site we found was a government site—<http://www.incometaxindia.gov.in>.

Go to the “Tax Law and Rules” link and you will find information on Income Tax, Wealth Tax, Gift Tax, et al. Anyone can refer to these documents, and students should browse through them for more details about a particular section or rule. The only problem is that the content is the actual Law and Rules that the government has set, so be prepared for a lot of legal jargon and tax parlance. If you're studying taxation at an advanced level, this is the easiest way to get access to all the official material that you need.

8.2.1 IndLaw.com—Income and Direct Taxes

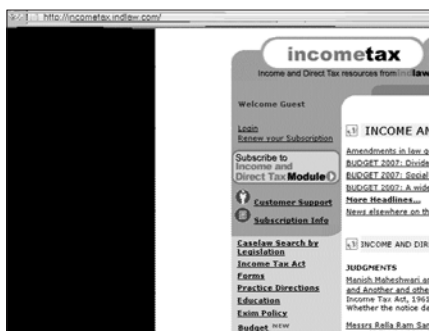
<http://incometax.indlaw.com/>

Income and Direct Taxes curriculum is taught from the Acts laid down by the Government. All the acts, rules, notifications, circulars and norms are mentioned on this site. Out of them, only certain sections and sub-sections from the Acts and Rules are taught at college level.

On the home page, you will find the latest changes or amendments in the Income and Direct Tax laws, so make sure to keep yourself updated. A lot of the content requires you to login, and a subscription will set a student back by Rs 2,200 for 150 hours of usage. If you can afford this, it's a good resource. After subscribing, you get access to Acts, Rules, Notifications, etc. The 2007

Budget is right at the top of the news page, because it directly affects Income and Direct Tax.

The site has a “Searching Case Law by legislation” feature which will help you study case laws with actual legislations, to give you a better understanding of the law or a particular clause.



Know thy taxes

The Income Tax Act is available as a quick reference, and all Income Tax forms, Challans and return forms are available for download. Students have a special section made available called “Education”, which contains all the information you’d need to pursue a profession as a CA or CWA.

The site a decent resource for students who want to learn about the Income and Direct Taxes of India. Articles related to Income Tax are also available. Those who are majoring in accountancy can refer to <http://salestax.india.gov>.

Excerpts

Finance Minister P Chidambaram today proposed to extend the service tax regime while unveiling a move to double the exemption limit for small service providers to Rs 8 lakh. It was also proposed to bring employee stock option plans (ESOPS) under the controversial Fringe Benefit Tax, a move that could be a dampener for stock markets as it will discourage companies from rewarding their employees by giving shares.

The revenue loss from the hike in the exemption limit will be Rs 800 crore, Chidambaram said while presenting the budget for 2007-08, adding he was happy to give this sum away in the interest of small service

providers and consumers. He proposed to extend the service tax to services outsourced for mining of minerals, oil or gas, renting of immovable property for use in commerce or business, development and supply of content for use in telecom and advertising purposes, asset management services provided by individuals, and design services.

Service tax will also be levied on services involved in execution of a works contract. There will also be an optional composition scheme under which service tax will be levied at only two per cent of the total value of the works contract. However, services provided by Resident Welfare Associations to their members who contribute Rs 3,000 or less per month will be exempted from paying the tax.

Service tax will also be exempted on clinical trial of new drugs and services provided by technology business incubators. Their incubates whose annual business turnover does not exceed Rs 50 lakh will be exempted from the tax for the first three years.

8.2.2 India Mart—Taxation

<http://finance.indiamart.com/taxation/>

The site has information about payment of Income Tax, filing of Income Tax returns, what forms to submit, different taxation clauses, etc., and legal parlance is made a little simpler. You can find information on Indian Tax Administration and procedures, different taxes and duties applicable, time limit payment, etc.

Excerpts

Basically assessment is an estimation for an amount assessed while paying Income Tax. It is a compulsory contribution that is required for the support of a government. It is generally of the following types.

Self assessment

The assessee is required to make a self assessment and pay the tax on the basis of the returns furnished. Any tax paid by the assessee under self assessment is deemed to have been paid towards regular assessment.

Regular assessment

On the basis of the return of income chargeable to tax furnished by the assessee an intimation shall be sent to the assessee informing him about the tax or interest payable or refundable to him.

Best judgement assessment

In a best judgement assessment the assessing officer should really base the assessment on his best judgement i.e. he must not act dishonestly or vindictively or capriciously. There are two types of judgement assessment :

Compulsory best judgement assessment made by the assessing officer in cases of non-co-operation on the part of the assessee or when the assessee is in default as regards supplying informations.

Discretionary best judgement assessment is done even in cases where the

assessing officer is not satisfied about the correctness or the completeness of the accounts of the assessee or where no method of accounting has been regularly and consistently employed by the assessee



The IndiaMart site on taxation is quite informative

Income escaping assessment or re-assessment

If the assessing officer has reason to believe that any income chargeable to tax has escaped assessment for any assessment year assess or reassess such income and also any other income chargeable to tax which has escaped assessment and which comes to his notice in course of the proceedings or any other allowance, as the case may be.

Precautionary assessment

Where it is not clear as to who has received the income, the assessing officer can commence proceedings against the persons to determine the question as to who is responsible to pay the tax.

8.3 Economics

Economics is a subject any commerce student will come up against, but is not everybody's cup of tea. It can be fun and interesting to learn, right from the basic level to advanced international economics, and information is easily available on the Web.

8.3.1 The Library of Economics and Liberty

<http://www.econlib.org/>

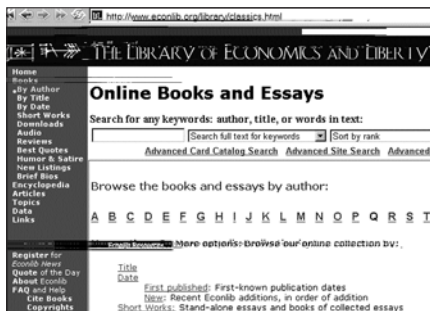
In terms of content, this site has books, an encyclopaedia, articles, data, topics and links regarding economics from all around the globe. For those who wish to refer to economic books, a few full online books from various authors including Alfred Marshall, John Milton, etc., are available here, completely free. You can find these books using the search function.

An encyclopaedia of articles on Economics is offered, which you can browse through by title, author or category. You can also look through the archives for older articles.

EconLog is a compilation of articles and insights of economics. Here, articles and opinions on particular economic problems are listed, making this site an invaluable library for students.

Excerpts

When watching the action of demand and supply with regard to a material commodity, we are constantly met by the difficulty that two things which are being sold under the same name in the same market, are really not of the same quality and not of the same value



Loads of free books at the Economics Library

to the purchasers. Or, if the things are really alike, they may be sold even in the face of the keenest competition at prices which are nominally different, because the conditions of sale are not the same: for instance, a part of the expense or risk of delivery which is borne in the one case by the seller may in the other be transferred to the buyer. But difficulties of this kind are much greater in the case of labour than of material commodities: the true price that is paid for labour often differs widely, and in ways that are not easily traced, from that which is nominally paid.

VI.III.3

There is a preliminary difficulty as to the term “efficiency.” When it is said that about equal earnings (or rather equal “net advantages,” see above II. IV. 2) are obtained in the long run in different occupations by persons of about equal efficiency, the term “efficiency” must be interpreted broadly. It must refer to general industrial efficiency, as defined above (IV. V. 1). But when reference is made to differences of earning power of different people in the same occupation, then efficiency is to be estimated with special reference to those particular elements of efficiency which are needed for that occupation.

8.3.2 McGraw-Hill Student Learning Centre

http://www.mhhe.com/economics/frankb/student_index.mhtml

Here you will find the book *Principle of Economics* by Robert H. Frank and Ben S. Bernanke. It provides introductory and core economic concepts for intermediate level students. The site covers almost everything you’ll come across in the standard school/college economics syllabus. Every chapter is followed by a chapter summary, a pre-test quiz and other exercises.

The site is invaluable for those interested in the basics, but is perhaps not the right tool for those looking to further their knowledge of economics after school.

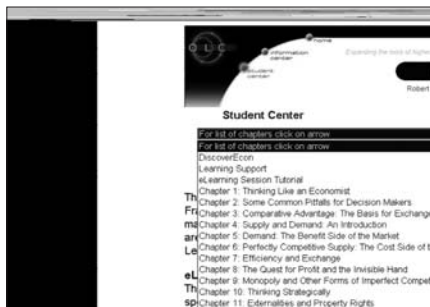
Excerpts

Demand: The Benefit Side of the Market

This chapter provides an in-depth exploration of the demand side of the eco-

conomic market. Individual and market demands for particular goods and services are the result of rational decisions by consumers that are interested in maximizing their total utility, or satisfaction, for a given level of spending. Prices and income play particularly important roles in determining con-

sumption patterns, and hence demand for goods and services. Rational decision makers will change their consumption choices when prices or incomes change. The responsiveness of consumption choices to changes in prices and income is reflected in the elasticity of demand. Sellers of goods and services are particularly interested in elasticity measures, as they provide important information about how sales (and revenues) are likely to change when the price of a product changes.



Read *The Principles of Economics* at the McGraw-Hill Student Learning Centre

8.3.3 AmosWEB—the Economics class portal

http://www.amosweb.com/cgi-bin/awb_nav.pl?s=cls&c=dsp&crs=micro

AmosWEB is an online class portal which covers micro-economics at the elementary level. Right from Economics basics to Factor markets, every topic is divided into lessons.

You can refer to the courseware which is detailed and simple. The examples refer to the economies of other countries, but will still help you they better understand concepts. Lessons are illustrated and explained well.

Excerpt

Demand

The concept of demand is fundamental to the study of the market and economics. It is the first of two sides of the market that we'll study.

A definition:

Demand is the willingness and ability to buy a range of quantities of a good at a range of prices, during a given time.

Three points:

- *Willingness and ability.*
- *Range of quantities and prices.*
- *A given time period.*

8.3.4 Notes of Roger A. McCain

<http://william-king.www.drexel.edu/top/prin/txt/EcoToC.html>

If you are looking for ready-made notes, your search ends here. The site lists 39 chapters on the essential principals of economics, with a few chapters still to be written.

The chapters that have been written, are done so as notes so that they can be referred to while studying that particular topic.

Excerpts***Surplus-Value***

So Marx addressed the question: if value is socially necessary labour time, so that labour produces all value, why does the market award incomes to people who do not work? His key insight was:

In a competitive capitalist economy, all commodities are priced at their values.

In a competitive capitalist economy, labour is a commodity.

Therefore, in a competitive capitalist economy, labour is priced at its value.

In other words: the wage paid for a labour-day would be the labour time socially necessary to produce the Labour Day. Suppose that it takes just half of a labour day to produce a labour day. Then workers will always be available for half a labour-day of pay, and employers, knowing this, will pay no more than half a labour-day of wages per labour-day. Half a Labour Day is left to the employers. It is “surplus-value” and is the source of profits, interest, and rent. Employers (and landowners and financiers) don’t have to do anything to get it—it is just “left over” after the competitive wage has been paid.

8.3.5 Springer Journals

<http://www.springer.com/west/home/economics?SGWID=4-165-0-0-0>

The Springer Journals have links that are useful for research level reference about economics in today's world. A number of journals, textbooks, series and new titles are available for Economics. Though more of interest to post graduate level students, it's never a bad idea to gain in depth knowledge, even when still in school or college.

Excerpt

Expected consumer's surplus as an approximate welfare measure

Except for a knife-edge case of preferences, the percentage error from using the change in expected consumer's surplus (ECS) to approximate the willingness to pay for a change in the distribution of a random price is unbounded, in contrast to Willig's (Am Econ Rev 66:589-597; 1976) famous approximation result for nonrandom prices. If the change is smooth on the space of random variables, and either the initial price is nonrandom or state-contingent payments are possible, then the change in ECS locally approximates the willingness to pay well. Unfortunately, this smoothness fails in some important applications.

8.4 Statistics

Statistics is a branch of mathematics, and is treated as a practical subject in commerce in the context of its practical application to problems.

8.4.1 Richard Lowry's page on Vassar College USA

<http://faculty.vassar.edu/lowry/intro.html>

Richard Lowry, a professor from Vassar College, has provided the web-world with a free and full-length inferential statistical textbook. This textbook covers topics at the graduate or college level. Each topic is explained with great detail and examples for better under-

standing. The site is extremely text heavy, and not exactly well designed. Every time you click on a chapter, it opens in a new window, so even if you're done with the current one, you will get a new Window when you click on the next chapter. Apart from that, a pretty good resource.

Excerpts

Correlation

Here is an introductory example of correlation, taken from the realm of education and public affairs. If you are a college student in the United States, the chances are that you have a recent and perhaps painful acquaintance with an instrument known as the Scholastic Achievement Test (SAT, formerly known as Scholastic Aptitude Test), annually administered by the College Entrance Examination Board, which purports to measure both academic achievement at the high school level and aptitude for pursuing further academic work at the college level. As those of you who have taken the SAT will remember very well, the letter informing you of the results of the test can occasion either great joy or great despair. What you probably did not realize at the time, however, is that the letter you received also contributed to the joy or despair of the commissioner of education of the state in which you happened that year to be residing.

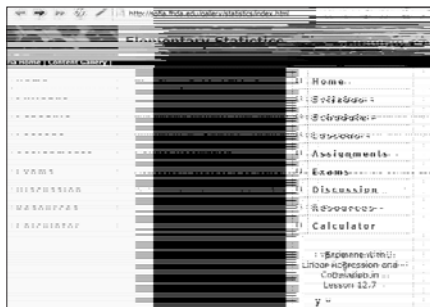
This is because every year the College Entrance Examination Board publicly announces the state-by-state average scores on the SAT, and every year state education officials rejoice or squirm over the details of this announcement, according to whether their own state averages appear near the top of the list or near the bottom. The presumption, of course, is that state-by-state differences in average SAT scores reflect underlying differences in the quality and effectiveness of state educational systems.

8.4.2 Elementary Statistics

<http://sofia.fhda.edu/gallery/statistics/index.html>

The best elementary statistics site so far! Simple yet attractive layout and good usage of colour makes the site look receptive to the user. Susan Dean and Barbara Illowsky are the authors of the courses. In all, there are twelve lessons, and each of them is part of the

elementary statistics curriculum that is taught in pre-college level standards. Every lesson is divided into sub topics, and has simple to understand language with images and tables that make the interface interactive and enjoyable.



Get your basics right

Simple and easy to remember examples make the learning a snap, and if you have the bandwidth, half hour audio/video presentations are also available! Students just beginning with Economics should pay this site a visit.

8.4.3 HyperStat

<http://davidmlane.com/hyperstat/index.html>

HyperStat is an online statistics textbook that covers almost all the topics you'd want it to—from basic to advanced levels. The layout of the site leaves much to be desired, with a column layout and Google ads right in the centre! However, the chapters explain concepts and topics well. You will also find a lot of references to other books and Web sites that are helpful.

When you are overwhelmed by jargon, the site offers relief in the form of a glossary of terms. You can also find free statistical analysis tools, instructional demos and chapter-wise exercises and problems.

Excerpts

Sampling Distribution

If you compute the mean of a sample of 10 numbers, the value you obtain will not equal the population mean exactly; by chance it will be a little bit higher or a little bit lower. If you sampled sets of 10 numbers over and over

again (computing the mean for each set), you would find that some sample means come much closer to the population mean than others. Some would be higher than the population mean and some would be lower. Imagine sampling 10 numbers and computing the mean over and over again, say about 1,000 times, and then constructing a relative frequency distribution of those 1,000 means. This distribution of means is a very good approximation to the sampling distribution of the mean. The sampling distribution of the mean is a theoretical distribution that is approached as the number of samples in the relative frequency distribution increases. With 1,000 samples, the relative frequency distribution is quite close; with 10,000 it is even closer. As the number of samples approaches infinity, the relative frequency distribution approaches the sampling distribution.

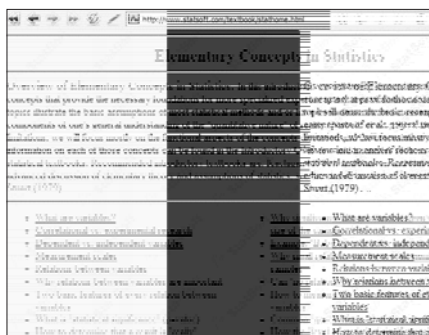


HyperStat's layout is a little bizarre

8.4.4 StatSoft's Electronic Textbook

<http://www.statsoft.com/textbook/stathome.html>

The Statsoft's electronic textbook has a list of topics on the right and an easily accessible search bar to help you find exactly what you want. The content ranges from beginners to intermediate, and topics are explained in a short and crisp manner, but without depth. It seems to be targeted more at Engineering Statistics than anything else.



StatSoft's Electronic Textbook is for the strong-willed only!

Excerpt

“True” Mean and Confidence Interval

Probably the most often used descriptive statistic is the mean. The mean is a particularly informative measure of the “central tendency” of the variable if it is reported along with its confidence intervals. As mentioned earlier, usually we are interested in statistics (such as the mean) from our sample only to the extent to which they can infer information about the population. The confidence intervals for the mean give us a range of values around the mean where we expect the “true” (population) mean is located (with a given level of certainty, see also Elementary Concepts). For example, if the mean in your sample is 23, and the lower and upper limits of the $p=.05$ confidence interval are 19 and 27 respectively, then you can conclude that there is a 95% probability that the population mean is greater than 19 and lower than 27. If you set the p -level to a smaller value, then the interval would become wider thereby increasing the “certainty” of the estimate, and vice versa; as we all know from the weather forecast, the more “vague” the prediction (i.e., wider the confidence interval), the more likely it will materialize. Note that the width of the confidence interval depends on the sample size and on the variation of data values. The larger the sample size, the more reliable its mean. The larger the variation, the less reliable the mean (see also Elementary Concepts).

8.5 Business Organisation

The curriculum for Business Organisation is somewhat similar to that of Management. Web sites in the *Management* chapter will also help you with this topic.

8.5.1. Mary Hogue’s Lecture Presentations

<http://www.personal.kent.edu/~mhogue/Pof%20Management.htm>

<http://www.personal.kent.edu/~mhogue/HRM.htm>

<http://www.personal.kent.edu/~mhogue/I&GBehavior.htm>

Mary Hogue of Kent State University has presented the syllabus of Principles of Management as PowerPoint Presentation files, where

everything is explained crisply. Each chapter is presented in a separate PPT file, and you have to download them all if you want to get anywhere. The presentations can be used as quick notes for revision.

If anything, the explanations are a little too crisp, and some principles of management, which others have written books about, are explained in the presentations in just a couple of lines. Still, it's a good start for beginners, and once you've downloaded the files, you can always reference them from your own computer, even when offline.

8.5.2 Managerial Marketing

<http://www.managerialmarketing.com/>

Marketing Management is one of the options available in lieu of accounting at the graduate level in some educational institutes. This site is completely dedicated to marketing management. Topics are listed on the right of the page, and clicking them provides you access to the short articles. This is another ultra-quick guide for those just looking to brush up on some basics of Marketing Management.

Excerpts

4.3. Illustrations: Marketing Research

Before discussing procedure let us see how marketing research might be applied in practice.

A BAKING MIX. The first example concerns the manufacturer of a new easy-to-use baking mix. Management had selected apartment dwellers, younger couples and those too busy to cook as target markets; it was supposed that these people would be most interested in this new product. Preliminary analysis showed that these consumers, if they responded as an expected, were numerous enough to make the baking mix profitable.

During the following months, sales and promotional efforts were aimed exclusively at these markets. The results were very disappointing.

Assuming the promotion to be adequate, the manufacturer "guessed" that the product itself might be unacceptable. At this point, a consumer survey was taken. The results were surprising. The target consumers were not particularly interested in the baking mix. Instead, the best market turned out to be those families who do their own cooking. They like the convenience of the mix, for preparation of a quick dish when in a hurry.

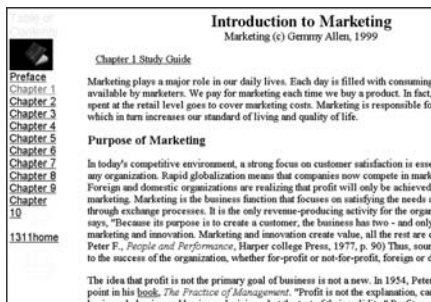
The original choice of target markets, based upon executive opinion, was in error. It led to an unsuitable plan and wasted promotional expense. This manufacturer, who had tried to reach the wrong markets with a good product, quickly changed his plans after the research facts were in. Preliminary information about consumer thinking might have avoided this costly error.

8.5.3 Online Book on Marketing by Gemmy Allen

<http://ollie.dcccd.edu/mrkt2370/book/mrktbook.htm>

An interactive online hyper book on Marketing by Gemmy Allen is available here for free reference.

The study guide has notes which you can use to periodically check your progress. Study notes also have an outline of the topics covered, definitions of important terms, objectives and discussion questions, etc. When you click on "review" you get a multiple choice quiz, based on the topics covered in the chapter.



Read one of Gemmy Allen's hyperlink books

Excerpts

Importance of Marketing

The American Marketing Association (AMA) defines marketing as the process of planning and executing the conception, pricing, promotion, and

distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational goals. This definition of marketing first appeared in *Marketing News* on March 1, 1986. It is included in the *Dictionary of Marketing Terms*, 2d edition, edited by Peter D. Bennett, published by the American Marketing Association, 1995.

The definition of marketing describes the nature of the process. Ralph Mroz of *ad lineam* defines marketing as the process that aligns the desires of customers with the capabilities of the enterprise. Marketing is a continuous cycle that involves satisfying customer needs and wants by creating mutually beneficial exchanges. A need is a state of felt deprivation. A want is the conscious recognition of a need. Marketing begins with an idea about a want-satisfying product and does not end until customers' wants are completely satisfied, which sometimes occurs after the sale.

The desire for a product together with the ability to pay for it is known as demand. More specifically, it is the quantity of a product that will be sold during a period of time at different prices. Demand comes from new customers and repeat customers. Marketers must find demand, as well as increase or decrease demand. Demarketing is the marketing task used to reduce or shift demand. Marketing is essentially management of supply and demand. Outstanding marketers go to great lengths to learn about and understand their customers' demands.

Arts



The Arts don't really lend themselves to the Internet very well. There's a lot of theory involved and a considerable amount of regional knowledge being developed (or uncovered, as the case may be). Most of the theoretical knowledge that is created in Arts subjects comes from the western world. Subjects like Sociology and Psychology find their foundations in the theories of scholars who were/are either American or European. Obviously, this means that given the information technology leap that they have over other nations, their texts and study materials can be easily found online.

9.1. Sociology

Most of the core course material and theory of Sociology is available online. This includes Foundations to Social Thought and Introduction to sociology. Information on most elective courses like kinship and society is also available.

9.1.1. Sociology Central

(www.sociology.org.uk)

Sociology Central is designed as a student's resource guide to sociology. Being a UK site, it is intended to serve the purpose of UK A-Levels learning, but it does suffice for first year and second year sociology students. The site serves essentially AQA (Assessment and Qualifications Alliance, an exam board in England) students, however, the courses and subjects are very similar to those run by the UGC.

The site has a simple interface with a few uncluttered icons that make it easy to understand for even non-sociology students. You can access each of the sections in the site by their respective buttons, however, if you are looking for something more specific that may be within one of the sections, you can try the drop down menu on the bottom left corner of the page.

To begin with, head to the Resources section. This section gives an overview of all the various resources that the site has for sociology students, that are either available for reading on the site itself, or for download. On the left are buttons for each of the different site resources. You can avoid the Schemes of Work button as that is a working schedule for AQA students alone, and has no relevance to Indian students. The Teaching Notes button leads you to an intro page that describes the various sub-topics in sociology for which teaching notes are available. These notes are short, well written explanations of most sociological concepts and are available for download in either Word or PDF format. There are also PowerPoint presentations (with slide notes) that you can download on certain topics like New Left Realism and Approaches to Deviance.

The Worksheets section is another very good resource. It contains full text papers on various sociology topics that, like the Teaching Notes, can be downloaded in both PDF and Word formats. This section of the Web site is fairly extensive and even has a section on research methodology that is relevant to anyone who is writing a paper or an essay that is going to be published. It's also a good guide for anyone who wants to make citations from sources both online and offline while paper writing.

The Revision section in Resources is a very good place to find pre-examination revision notes. This section has word files that can be printed and used before exams for quick revision.

Head back to the home page and click on the Online Resources button. The page now displayed will give you a brief introduction to the various online resources that are either available on the site, or the site is linked to. This section also includes a Video Vault that has a collection of video clips that explain certain sociological concepts. These videos are hosted on Google Video so you can stream them from your browser itself.

The most interesting online resource is the Sociological Detective, which essentially is an analysis of sociological concepts using the analogy between a criminal and a sociological investigation. Essentially, these are case study

investigations into happenings in the field of sociology. These are updated regularly with all the details required to solve the case.



The Online Resources section is a warehouse of interactive study tools

Overall, this is a very useful site for sociology students with almost everything from revision help to full text theories covered.

9.1.2 Quia

(www.quia.com/pages/sociologytamara.html)

Quia is an e-learning portal that acts as a study supplement to students taking their A-levels. Once again, though the site is essentially British, it does hold enough relevance for the UGC board scheme of things as well.

Now, if you can get past the tacky graphics and gifs that hover around the Web page, it'll become clear that as a learning resource, this site actually does have some substance. On the left hand side of the page, is a links bar that contains links to the various sections of the site. These links are sorted by the various sociology sub-topics. The Links bar also holds links to some interesting readings to supplement one's study. For example, there is a link to an online sociology dictionary that gives the definitions of some common sociological terms.

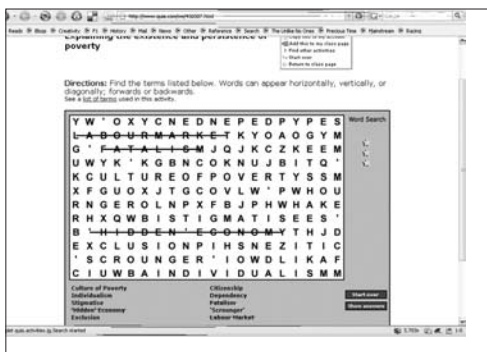
The right hand of the page contains another links bar (and more cheesy GIFs). These links deal with the A-levels coursework. However, at the bottom you will find an interesting link on "Marxism made simple." This external page is a layman's guide to one of the most relevant sociological theories being studied today—besides it's good reading anyway!

Though it may seem a little blog-ish at first, you will find that there is a lot of information stored within the pages of the site. And there is also a lot of content that you may not spot at first glance, so take your time going through it.

The site has a lot of standard information on various sub-topics of sociology including Crime, Wealth and Poverty, and Families and Households. However, unlike other Web sites, Quia also gives a host of related links at the bottom of every topic's page. This is a

very valuable addition, especially since these links actually supplement the information provided on Quia's pages, as opposed to being just different Web sites with the same information.

Quia also has a host of quizzes and Java-based games that can be played by readers. The links to these can be found at the bottom of the subject pages under a section called Quia Activities. Quia Activities include quizzes, Java games



Word Search on Quia—find Individualism!

and Hangman—a word formation game. These Hangman (or is that Hangmen?) games also revolve around sociology and sociologists, and are an interesting break from the theory. The Java games are of four types—Matching, Flashcards, Concentration and Word Search.

Matching is, basically, matching a particular sociological term with its relevant definition. This game is based on cards that have either the term or the meaning written on them. You need to click on a term, and then click on the card that has its meaning to get a point. Flashcards is a game based on flashcard, which, like in Matching, have either terms or meanings on them. You need to connect the term card with the meaning card. Concentration is basically Matching with the cards turned upside down. You need to match the card with the term with its right meaning. You also need to do this in as less number of tries as possible. Word Search entails searching for some Sociology related terms in a big jumble of words. This is the most fun and testing of all the games on the site.

Though the site may not be as functional as it is colourful, it does get points for its interactive content that is quite engaging.

9.1.3 Sociosite (www.sociosite.net)

Sociosite is a Sociology Web site hosted and maintained by the Social Science Information System based at the University of Amsterdam. It is a minimalistic Web site that has very few obtrusive graphics. But what it lacks in design, it more than makes up for in content.

The Web site features a relatively uncluttered interface with a simple tabular structure. The buttons on the homepage are self-explanatory and deal with a host of resources. These range from Subject Areas to Sociologists to even blogs on sociology. The site essentially stores a host of links and, in some cases, some text, on a variety of subjects related to sociology. For students, this makes for an ideal reference location for studies.

Essentially, the site is like a Yellow Pages of all Web sites and Web pages that are dedicated to studies in sociology. Click on the Subject Areas button and you are taken to a page that shows all the various sub-topics of sociology for which online resources are available. This list is quite exhaustive, and each sub-topic has at least eight to ten links under it that are related to that topic. There is even a search bar so you can easily find several resources for what you are looking for. We searched for several terms including Poverty, Welfare, and Citizenship, and the search engine displayed over 20 relevant results for each.

The Sociologists button on the homepage gives a list of all the various “Godfathers” of Sociology. Most of these theorists, authors and thinkers also have several Web pages dedicated to their works, and you will find them all in this section. The section also has a “Homepages of Sociologists” link that will take you to a page that contains links to all the personal homepages of modern sociologists.

Each of the links provided in Sociosite have a small explanatory paragraph attached to them that tells about what is contained in the link. Some of the links are direct links to PDFs and other texts related to sociology and sociological theories.

The Weblogs button on the homepage is an interesting resource as it gives links to various blogs around the world that are updated about topics in sociology. For students, this is a great place to keep up-to-date on all the recent develop-



The site also features a link on the lighter side of sociology

ments in the field of Sociology. There are over 25 blogs from all over the world that are linked to this page, and they deal with not only global sociological issues, but regional issues as well.

Overall, the site is well maintained (there are no broken links) and quite exhaustive, which makes it a must-visit for sociology students.

9.2. Psychology

For undergraduate psychology students, there is a vast amount of resources available on the Web that can be found for any psychology sub-topic including Organisational Behaviour. Specialised subjects in the post-graduate programmes are slightly harder to find references for.

9.2.1 Alley Dog

(www.alleydog.com)

Alley Dog is the self proclaimed "Psychology Student's Best Friend." The site has a slick interface with well-designed buttons and links that are very descriptive and easy to understand.

The home page has, at the top left corner, a large search bar that is intended to help find definitions in the psychology glossary. We tried several searches of terms including Dissonance and Mitosis and found a crisp, easily-understandable definition for the term. You can also browse the glossary as a whole by clicking the Glossary button on the homepage. The glossary is classified alphabetically with most psychology-related terms.

The Class Help button on the homepage takes you to a page that offers notes on psychology-related subjects. These notes are exhaustive, and are written quite crisply with bullet points, and one can easily convert them into revision notes for pre-exam revision.

This site is essentially intended for American students but is quite relevant for Indian students as well—at least at the undergraduate level, the courses are almost identical. For students looking to apply to psychology schools in the States, the site also has an effective guide to graduate psychology schools in the US. This can be accessed by clicking the Grad School button on the homepage. This page also has a Grad School search engine so you can search about any American college that offers a Psychology programme. The search engine also lets you narrow your search options by giving you search criteria options—region, degrees offered and programs offered. It's a good starting point for anyone who wants to study psychology in the US.

The guide to getting into a good graduate school has some FAQ type links that answer common questions that students may have about getting into a good graduate school. There is also some GRE related help which, for Indian students, is a big bonus.

The site also gives a free e-mail address for psychology students. You can register for an account by clicking on the Email button on the homepage. The free account is an ad-supported 25 MB account which is very basic and lacks many of the features that other free hosts like Gmail and Hotmail provide.

The Sites and Links button on the homepage takes you to a topic menu—a database of Web sites and Web pages that have subject matter related to topics in Psychology. The best part about this section is that each of the site links are followed by a good description of the site, its subject matter and what the site has to offer. The Journals button on the homepage takes you to a page that has a list of psychology related journals' Web sites / pages. All the journals mentioned in this page are arranged alphabetically. However, we did find a few broken links in this section.

The site also has a Today's Word link that has a word or term related to psychology and its definition. This word gets refreshed daily. You can also sign-up to have it sent to your email Inbox every day.

The most interesting part of the site by far has to be the Forums. This is a standard message board style forum that you can register for free. The forums are classified according to subject and under each subject we found several interesting threads started by psychology students with doubts, clarifications or just something new to share. The forums seem to be updated daily reflecting a good amount of student activity.

Get Psyched!—Free e-mail at Alley Dog

9.2.2 Higher Education Academy Psychology Network (www.psychology.heacademy.ac.uk)

The Higher Education Academy is a UK based learning centre that hosts this Web site. The Web site is fairly comprehensive in the information it holds about psychology and psychology-related sub-

jects. It is also updated almost daily with news and developments in the field of psychology.

There are two ways to navigate the site—the top main menu, or the left hand side list of links. The links at the left-hand side of the page number more than those in the top menu, and expand as you go deeper into the Web site. Site navigation is simple, and the site also provides reference links for information that is not available on the site as well.

Head to the Resources section that displays a search box which lets you search the various resources that the site has. These resources are in the form of either information on the site itself, or links to other sites that may have the information. If you are unsure about what you are looking for, click the Browse resources link on the left hand side of the page. This gives you a detailed look at the various resources and types of resources that the site has to offer.

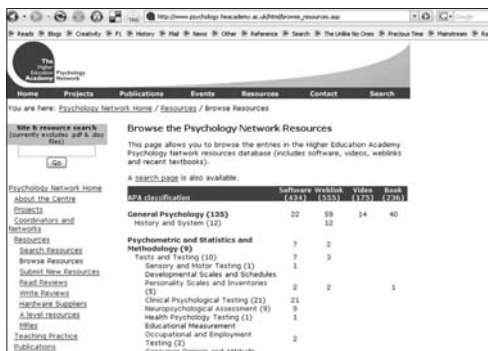
The resources are sorted by Software, Weblink, Video and Book. Software is any multimedia arrangement that facilitates the study of a particular topic in psychology. This includes coursework slides and PowerPoint presentations. Most of these software are hosted by other parties and require payment for their use. However, for students just looking for revision PPTs, this is a good place to look.

Weblinks are an exhaustive list of Web sites and Web pages that contain information regarding specific topics in psychology. These links are well classified and are each supplemented with a short description, keywords (for easy search) and the date when the link was last updated. This is really beneficial as through the description itself, you will know whether this was the resource you were looking for. Each topic has a few links, so you have a choice as well.

The video resources are either links to VHS / DVD related to the particular subject that you can buy online, or links to places where you can either download videos or watch them streaming

on a video host like YouTube or Google Video. Only a few sub-topics have video links; these are not as common as Weblinks.

The Books resource is essentially links to books on the subject that you can buy online, or download full text PDFs of. The site also hosts reviews of a lot of popular psychology books that you can download onto your PC (in PDF format) to read. You may also contribute to this network by submitting your own book reviews on books that are related to psychology in any way. The site has a guide to writing a book review in the APA (American Psychology Association) style that you will need to follow to submit your book review.



The screenshot shows a web browser window with the URL http://www.psychologyresources.ac.uk/index_browse_resources.asp. The page has a navigation bar with links: Home, Projects, Publications, Events, Resources, Contact, and Search. Below the navigation bar, there is a search box and a list of links on the left-hand side: Psychology Network Home, About the Centre, Projects, Coordination and Networks, Resources, Search Resources, Browse Resources, Submit New Resources, Read Reviews, Write Reviews, Hardware Supplies, A Level Resources, News, Teaching Practice, and Publications. The main content area is titled 'Browse the Psychology Network Resources' and contains a table of resources categorized by APA classification.

APA classification	Software (434)	Weblinks (555)	Video (175)	Book (236)
General Psychology (129)	22	59	14	40
History and System (12)		12		
Psychometric and Statistics and Methodology (9)	7	2		
Tests and Testing (10)	7	3		
Sensory and Motor Testing (1)				
Developmental Scales and Schedules				
Personality Scales and Inventories (5)	2	2		1
Clinical Psychological Testing (21)	23			
Neuropsychological Assessment (9)	9			
Health Psychology Testing (1)	1			
Educational Measurement				
Occupational and Employment Testing (2)	2			
Consumer Opinion and Attitude				

The list of resources catalogued on this Web site is huge

Click on the A Level Resources link on the left-hand side of the page to get even more links and resources to subject matter related to psychology. This link is essentially intended for British A-level students, but is useful for under-graduate psychology students as well. All the links mentioned in this section are also classified in the same way as the others on the Web site.

9.2.3 American Psychology Association (www.apa.org)

The American Psychology Association is the vanguard of teaching and learning in psychology worldwide. It is considered to be at the forefront of all the major developments in this field, and the APA style is the most commonly-used style of referencing text all over the world.

The APA Web site is very formal, and reflects the personality of

the organisation which is quite efficient and effective in its delivery of information. Though this Web site may not be too relevant for undergraduate psychology students, it is more than important for post-graduate students and students pursuing higher studies in this field.

The site aggregates important news and developments in the field of psychology from all over the world and displays them as news links on the main page. In addition, you can search for what's new in a particular subject of psychology by clicking on any of the topic links that have been efficiently catalogued under a box called Psychology Topics. Clicking on any of the topics takes you to that topics respective page, which contains, apart from news related to the topic, a host of other information about it such as recent studies conducted and articles about it in psychology or social science journals from all over the world.

The site has a paid membership scheme as well; the cost of the membership depends on what kind of membership you want (Associate, Student, etc.) and how many journals you want to subscribe to. However, we found there to be enough "free" data available on the Web site to make it worthwhile for any student.

Click on the Students link on the left-hand link bar of the page. It takes you to a page dedicated to answering questions about psychology any student may have before he/she decides to start a career in it. This is a section that is particularly helpful for students who have just passed out of school and are wondering about studies in social sciences. You can find information here on career options, funding for studies abroad and even a students forum where you can discuss issues with other students from around the world.

The News link on the left-hand side of the page gives information collected by various newswires about psychology. There is also a link to gradPSYCH magazine, which is a magazine for American graduate students. This magazine has interesting articles and

research about developments in psychology and theory.

Overall, the APA site is a valuable resource for any student either beginning an education in psychology, or for students who are looking for further studies in this field.



Stay one step ahead with gradPSYCH magazine

9.3 Political Science

Political Science is very region-specific, as the information taught has a lot to do with the polity of the country with respect to the world. So though there are some general principles that are common to political science students around the world, there is a large portion of text that is entirely nation-specific.

9.3.1 Vanderbilt University Central Library of Political Science

(www.library.vanderbilt.edu/romans/polsci/)

Vanderbilt University in the United States has a sizeable political science department. This university has, in fact, one of the most prestigious political science courses in not only the United States, but all around the world.

The Web site is basically a catalogue of various sub-topics on political science ranging from Political Theory to International Relations. The links under these sub-headers contain databases of

links relating to that particular subject matter from third-party sites from around the world. The classification is done well and is easy to understand.

Each section has under it a link called Popular Starting Points which, as the name suggests, has links that make the topic easy to understand even for a person who is not educationally related to Political Science. Each of the links provided have an accompanying paragraph about what is contained on those Web pages.

For undergraduate students, the Political Thought section is a good place to start. This section contains links on Political Theory and Ancient and Modern Political Philosophers. The links under this section suffice for the foundation courses in Political Science. Each of the sites provided also mention the name of the author or political theorist whose site it is, or whose theory is being discussed. We were unable to find any broken links. Also, the site is updated frequently so a link that does not exist anymore is either removed, or a notice of the same accompanies the link.

The Ancient and Modern Political Philosophers sections contain links sorted by the names of these philosophers. You will find exhaustive texts (including biographies) of these philosophers on these pages. Some of the links are direct links to PDF documents with works of these authors that you can download for free. The General Resources section also has referencing tips if you want to reference any of the text found on the pages for a research paper or article.

At the bottom of the homepage you will also find a search bar that allows you to search for articles, research papers or books related to topics in Political Science. The search engine scours the site for related texts. You may choose to refine your search by author, description or title and sort your results by either title or date. We ran a search on “India” and found results pertaining to nuclear weapons proliferation, Indian political news, and some controversial topics like India’s response to the September 11

attacks. Overall, the site is a great starting point for any undergraduate or postgraduate student of Political Science. The site can be navigated easily and has an interface that is very functional and light on the eyes, and bandwidth.



The section on Ancient Political Philosophers is quite detailed

9.3.2 Samarth Bharat

(www.samarthbharat.com)

Samarth Bharat is a site run by a few Indians inclined to Indian political thought, and generally, Indian current affairs. Though the site may not have much political theory information in it, it is a good place to read articles and research papers on developments in modern Indian polity.

The site has some pretty tacky graphics replete with GIFs and colourful links. On the left-hand side of the homepage you will find a scrollable links menu that contains links on a host of subject matters including Political Structure, Governance and Constitution and even a link to a section called BJP & RSS. The articles held within these sections relate to government policies and schemes related to the subject matter of the section.

Some of the articles are downloadable in PDF format and can be downloaded free of charge. In the Political Structure section of the Web site there is a good piece called the "Story of Development of Indian Political Thought," which is a must-read for any undergraduate political science student. This article can be downloaded in PDF format, and as a ZIP file. There are other such theory related articles as well in this section that you can either read on the

site itself or download to your computer. These articles are a bit old (2004 and earlier), but they are still relevant as they deal with the history of political thought in India.

The Current Articles section is more up-to-date and has articles and research papers on topics such as reservation in colleges. This section also has a lot of non-political topics written with a political slant. For example, there is an article in this section on Land Acquisitions and it heavily references the Constitution and laws relating to the subject.

The Governance and Constitution section of the Web site has articles based on institutions of the government such as education, railways, etc. Some of the articles in this section are available for download both in Hindi and in English. For post-graduate students, this site is a great resource as the articles not only talk about current theories in the Indian political system, but also thoughts on how to change them and what are the pros and cons of each. For example, in the Justice and Judiciary section of the Web site, there is an article that argues for the keeping of the death penalty in the Indian judiciary system. Of course there is a certain political writer's bias in some of the pieces, but each article is well thought out and tries as far as possible to give both sides of the story.

The site also has a section called Pakistan which has articles related to Indo-Pak issues including not only Kashmir but other matters such as trade policies as well. The site however lacks a search bar that would



The Political Thought section has several must-read articles for students

have made browsing through so many articles much easier. Overall, the site is a good resource for students looking for Indian Political thought and new developments in the same.

9.3.3 Ministry of Law and Justice

(<http://lawmin.nic.in/>)

The Ministry of Law and Justice Government of India Web site is one of the most valuable and under-rated resources available to political science students today. Maintained by the Government of India, it is updated frequently with all the changes made in the Indian Legislative system. However, it is also one of the worst sites to navigate and is thoroughly confusing to anyone who is not studying political science.

The site, like most Indian Government Web sites, is very information heavy but not user-friendly at all. For example, every site link that you click opens in a new window of your browser. Also, there are no "Home" links on any of the pages, so either you make sure that the home page is open at all times, or you type it in to your address bar the next time you want to access it.

But what the Web site may be lacking in formatting and interface, it more than makes up for in content. Each of the subsections of the Web site have Introduction links that give a brief introduction of what the section is about and how it is relevant to the Indian Political structure. For example, the Introduction link to the Legislative Department has a short history of the department and a few of the key functions that it is intended to perform.

Apart from this there is also a link to the Constitution of India. This link takes you to an index page which is essentially the table of contents of the Constitution which is updated up to the ninety third Amendment. The table of content contains links that allow you to download the sections of the Constitution in PDF format on to your computer. You can also visit the Constitution Web site at <http://indiacode.nic.in/coiWeb/welcome.html>. This Web page

allows you to find whatever you are looking for in the Constitution with an easy Search option.

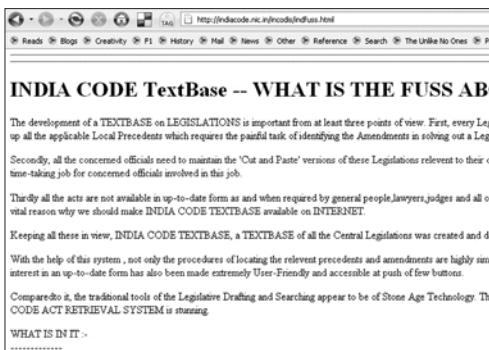
One of the most relevant links on the Web site is the India Code link. The

India Code is a text base of all the legislations passed by the Central Government. This page contains legislations passed by the Government right from 1834 onwards. The India Code page features a search option that allows you to

search for Parliament and Legislative Assembly Bills by Title, Act Year, Act Objective and even Full Act Text. You may also choose to browse these Bills by clicking on the Parliamentary Bills or the Legislative Bills links on the page. You can also browse the Acts alphabetically and chronologically by clicking on the relevant links on the left hand side of this page.

The Law Ministry Web site also has related links to the Supreme Court of India and other related Government institutions as well. The left hand side of the page has a bunch of expandable links with related material to Indian law and justice. This is possibly the least confusing section of the Web site as well.

This Web site is a must visit for any political science student who intends to make a career in that field. Please also use the Contact the Webmaster link to tell him/her that the site needs a major facelift!



See, the Government can be cool too

9.4 Anthropology

Anthropology coursework, like with sociology, can be found online for mainly the general theories and practices. This is relevant for both first and second year Anthropology graduate students. There is a vast portion of information also available for students pursuing higher education in Anthropology.

9.4.1 Virtual Library of Anthropology

(<http://vlib.anthrotech.com/>)

The Virtual Library of Anthropology is maintained by an organization called Anthrotech. It is a superlative guide to Anthropology that contains information and resources about almost all Anthropology related topics.

We recommend that you register on the Web site before you start browsing through it, as many of the sections require logins. Registration is free and you can register by clicking on the Create Account link at the top right hand corner of the page. Registration allows you access to all the different sections of the Web site including the forums which are accessed by anthropology students and enthusiasts from around the world.

The USP of the site is its directory. The Directory is a database of several hundreds of links on issues and subjects related to Anthropology. Most of the links provided are quite recent; however some sections have dated links of Web pages that are quite old. We did not find any broken links though.

Site navigation is fairly simple. The homepage has a lot of buttons and links but these are conveniently arranged for easy access, and are largely uncluttered. The homepage also has Site of The Day and Site of the Month links, which feature selected sites that have relevant and current information on anthropology and related developments around the world.

The site also has a Game Center; however there is just one link on this page—Anthro Hangman. This is an interesting game that involves identifying an anthropology related word with a



With Anthro Hangman, who needs Counter-Strike?

hint and a limited amount of tries. For first year students of anthropology and those who are just interested in the field, the ideal place to start is the Explore Anthropology link on the homepage. This link provides brief guides to various sub-fields in anthropology, along with reference links for further study. For example, the “What Is Anthropology” link gives a brief introduction to anthropology and the study of the subject. At the end of the page is a list of references that you can click on to get more information regarding the question.

The search bar on the homepage allows you to search for any keywords related to the topic you are looking for. It also allows you to search within anthropological sub-fields like applied anthropology and biophysical anthropology. Each of the sub-sections contains a directory of links related to the subject.

The forum is a good place to find students and enthusiasts of Anthropology and to discuss issues related to the subject. It is divided by sub-fields of anthropology and is largely un-moderated. You can also see who's online at the particular moment and see your general forum stats like number of posts, etc., as well.

9.4.2 Palomar College Anthropology Program (www.palomar.edu/anthropology)

The Palomar College Anthropology program Web site is hosted by the Behavioural Science department of the Palomar College. Though it is essentially intended for anthropology students of the college, it bears relevance to Indian anthropology students.



Crossword puzzles spice up the tutorial experience

The Web site is simply designed, and navigation is not complicated. The homepage has a brief introduction to Anthropology along with a list of Anthropology Weblinks. These links are classified according to sub-areas of anthropology and provide comprehensive overviews of the same. There is even a link on Anthropology as a Career which takes you to a Web site that gives students all the various career options that one has when one decides to enter the field of anthropology.

The really worthwhile section of this Web site is its Anthropology Tutorials link. Tutorials are available on all topics related to Biological and Cultural anthropology. These tutorials are quite exhaustive and contain large quantities of study and reference materials that students can use.

Biological Anthropology has study material on subjects ranging from early theories of evolution to evolution of modern humans. Each of these subjects has text matter related to it,

along with sound clips that can be downloaded on to your computer. The text matter is quite descriptive and is replete with photographs and practice quizzes. The practice quizzes are linked at the end of each study page and are objective type quizzes based on the material on the page. The navigation within these pages is excellent with well placed Home and Back links that are unobtrusive.

Apart from quizzes, each subject also has Flash Cards links. These flash cards are text cards that are based on the topic. You can view them on the site and download a printable version of the same. The flash cards come in handy for easy revisions before examinations. They are also effective in stimulating your memory on different topics.

Each subject also has a crossword puzzle related to the subject. You can play the crossword puzzle online or download a printable version onto your computer. To play the crossword puzzles on your computer, you need to ensure that your browser is Java-compatible.

Along with this, each subject also has a list of references on the Web that contain information regarding the subject. There is also a glossary of terms for any of the terms used within the subject. An interesting addition is the Web Expeditions link, which takes you to a page that has a few Web expeditions that students can carry out themselves. Essentially a Web expedition is a case study or a question related to the subject for which you can use a host of search engines, all linked on the page, to find the solution or answer.

This is one of the best Web tutorials for Anthropology available on the Web and a must visit for all students of the subject.

9.5 Literature

The subject matter taught in literature courses differs from college to college, and even UGC does not specify one particular guideline for colleges to follow in the discourse of this subject. However, we have tried to cover most commonly taught principles and courses covered in literature courses.

9.5.1 Luminarium

(www.luminarium.org)

The Luminarium is the self-proclaimed anthology of English Literature. It is perhaps the most vast of all Web resources on English literature, even containing an encyclopaedia on the subject.

The site is very well designed with Elizabethan styling including fonts and pictures. Navigation is fairly simple and though there are pages that have over 20 links on them, the design is uncluttered. The homepage is designed chronologically, that is, it has links to pages that contain subject matter related to particular periods / eras of English literature. It starts from the Mediaeval and ends at Restoration covering four of the most prominent and influential eras of English Literature.

The homepage also has links to information regarding the different types of writers who were influential during these periods. They range from the religious writers to the cavalier poets. Each of these links contains vast amounts of information regarding its particular subject matter.

The era links take you to pages that contain information on particular writers during those eras. For example, the Medieval link has links to works of Chaucer, Gower, and Gowain amongst others. There are also essays and articles linked to each of these eras that can be accessed by the Essays and Articles links that are displayed on the pages.

Each of the writers have their own page that contain quotes, a

biography, a list and description of the writers works and other resources. The amount of quality information available on this Web site is unsurpassed and therefore, it makes the Web site a must visit for all levels of



The Luminarium homepage is wonderfully designed and yet remains extremely functional

literature students. Each of the writers' pages also has a link to additional resources for further information on the writers that may be available on other sites online. The site also hosts essays on the writers that have been contributed by literature professors from institutes around the world.

On the homepage, you can search, via a Google-powered search bar, the entire Web site. The homepage also has a link to the Luminarium Encyclopedia Project. This project essentially provides a historical context to all the various information provided on the Web site. On the right-hand side of this page you will find an index of links that is basically a contents bar for the encyclopaedia. Each of the entries in the encyclopaedia is a well research context piece on either the writer or the period and makes for interesting reading even for non-students of literature.

Overall, the site is by far the biggest database of English Literature information available on the Web today and is a must-visit for all literature students.

9.5.2 The Internet Public Library

(<http://www.ipl.org/div/litcrit/>)

The IPL is a site hosted by the School of Information of the University of Michigan. The site is essentially a reference guide to sites that contain information regarding certain topics on literature. The site also has a special collection on literary criticism which is very exhaustive.

The literary criticism collection contains links to critical and biographical Web sites about different writers and their works. The site is well designed and navigation is very simple. On the left hand side of the page you will also find links to other collections that are maintained on the IPL which include almost all Arts subjects as well.

The main page of the literary criticism collection allows you to browse for criticisms using a variety of classifications. You can browse using the author's last name, or the title of some work, or by different literary periods. You can also browse the collection through literary styles of different geographical regions. This option is available on the right hand side of the page. Here you will also find a link to Indian literature.

The Indian literature link is not as exhaustive as links to say American literature. However, the Webpage does contain links to three very good Web sites that contain information regarding criticisms of Indian literature. You can also find links to criticisms of the works of Anita Desai, Bharti Mukherjee, and A K Ramanujan on this page.

A good place to start your look into this Web site is the Online Literary Criticism Guide. This page contains links to Web sites that are good starting points into a study of literary criticism. Each of the links is accompanied by a paragraph that describes the Web site efficiently, so you know exactly what you'll get at the link you click. The links on this place also contain links to studies on liter-

ary theory that complement the study of literary criticism, and in fact, provide a basis for the same.

The Web site also features an “Ask A Question” service. This is a one of a kind service that allows you to pose any question related to the subject of literature to the staff of the IPL. You can ask any query you may

IPL The Internet Public Library

Accessibility Info
Subject Collections
Arts & Humanities
Business
Computers
Education
Leisure
Health
Law & Government
Regional
Science & Tech
Social Science
Ready Reference
Almanacs
Dictionaries
Encyclopedias
More Ready Reference...
Reading Room
Books
Magazines

IPL Ask A Question Form

Need an answer fast? Hundreds of our most popular questions and answers are listed on our [Frequently-Asked Reference Questions](#) pages.

Want to know more about [how the IPL "Ask a Question" Service works?](#)

Please review our [Privacy Statement](#) before submitting your question.

* required information

Name*

E-mail*

Provide a complete e-mail address (example: [fxyz@yehoo.com](#)) so that we can reply.

Confirm e-mail*

If you have parental or guardian controls turned on, please go to [http://www.ipl.org](#) to your child's mail list.

This helps to ensure that

The Ask A Question option on the IPL is a feature that makes this site stand out

have about literature by filling up a simple form. Your question is answered by students and librarian volunteers from schools around the United States and Canada. Obviously, this means that you won't get your reply immediately. However, the site claims that your question will be answered usually within a week. If you want a question answered quicker than that, you can mention that in the form, and the site will try as far as possible to answer your question within the date you give.

The site also has a search engine that is situated at the top right hand corner of each and every Webpage within the site. We ran a search on “Hindi” and found links to Web sites related to Hindi grammar and an online Hindi dictionary. We also found a link to a library of Hindu history.

Overall, the site is very well organised and has some exciting features for literature students.

This image shows a full page of a document template designed for writing. It features approximately 30 evenly spaced, thin grey horizontal lines across the entire width of the page. The background is white, and there are no margins, headers, or footers visible.

[illegible]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings on the page.

[illegible]

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